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ENTY-NINTH YEAR OF SERVICE TO THE METAL WORKING INDUSTRY

JUN 29 1934

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THE IRON AGE

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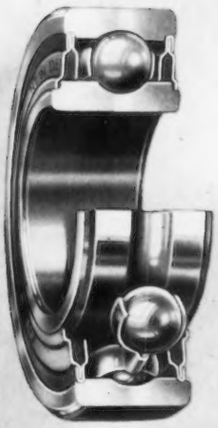

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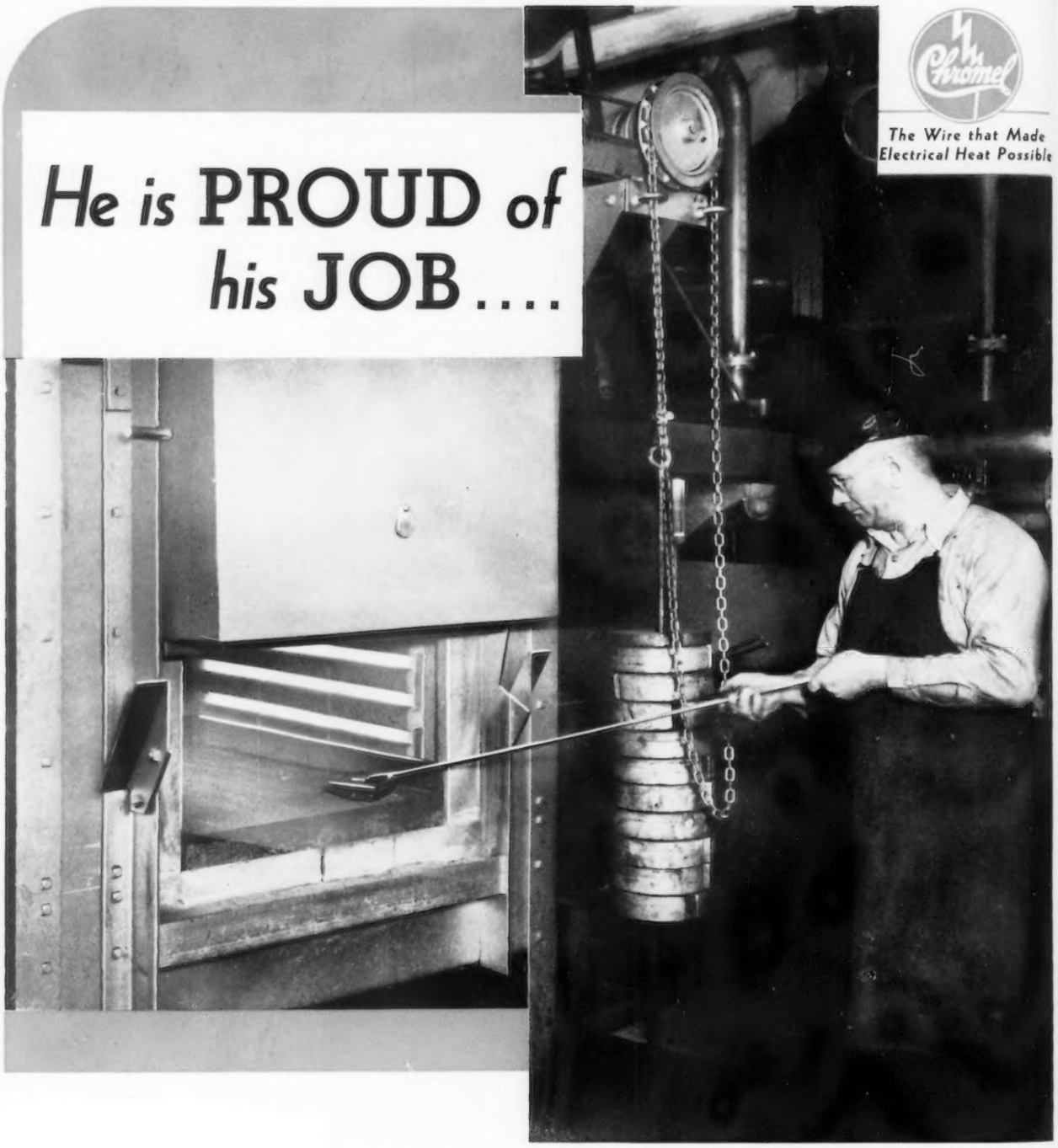

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THE IRON AGE — June 28, 1934

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JUNE 28, 1934

ESTABLISHED 1855 Vol. 133, No. 26

The Fable of the Cows and the Foxes

"ONCE upon a time an ambitious group of foxes determined to exercise their will upon a herd of cows. 'We must control them,' said they, 'so that we can get their milk and live upon it. Then we will avoid the hard labor of hunting our food and have an easy living.'

" 'The thing to do,' said the conceited foxes, 'is to terrorize the herd with our sharp teeth, after which they will obey us and pay us tribute. Let us, therefore, show our power by seizing a few cows and tearing them to pieces.'

"It was easier said than done, for the best that the conceited little foxes could do was to nip at the legs of the herd and annoy them.

" 'It is clear,' said one of the foxes, 'that we cannot get what we want in this way. Let us, therefore, lay our case before the king elephant and enlist his help.'

"So with blood from the wounds of the cows dripping from their noses, the foxes ran to the elephant. 'See, O king,' said they, 'how roughly the rude cows have treated your loyal subjects, the foxes. They have assaulted us and have given us bloody noses. In the name of justice and a new deal for the foxes, we beseech your intercession in our behalf. Make us rulers over the cows, your majesty, so that we can obtain their milk and so that hereafter they will be our servants.'

"Upon which the king elephant—" *but here, the ancient manuscript was torn away, so that the conclusion is missing. You, dear reader, will have to finish the fable for yourself and also find the present-day moral in it. We, ourselves, do not think that the king elephant was unjust or unwise enough to give to the foxes power over the cows that they could not obtain otherwise than by trickery.*

J. W. Vanderveer

Welded Heat Exchanger Shells

FACILITIES for keeping set-up time as low as possible, at the same time providing maximum safety of operation, are of outstanding interest in the new X-ray laboratory installed at the Westinghouse South Philadelphia works for inspecting welded heat exchanger shells, castings, and miscellaneous parts. A battery-driven work-holding truck, centralized push button controls, adjustments of work and tube and the indicating devices designed to facilitate setting-up are described; also the X-ray machine and the control room, which is convertible into a dark room and contains every convenience for developing, fixing and drying films. The method devised for X-raying very small specimens is outlined. Ease of operation and freedom from physical and mental fatigue on the part of the operators are noteworthy in this installation.

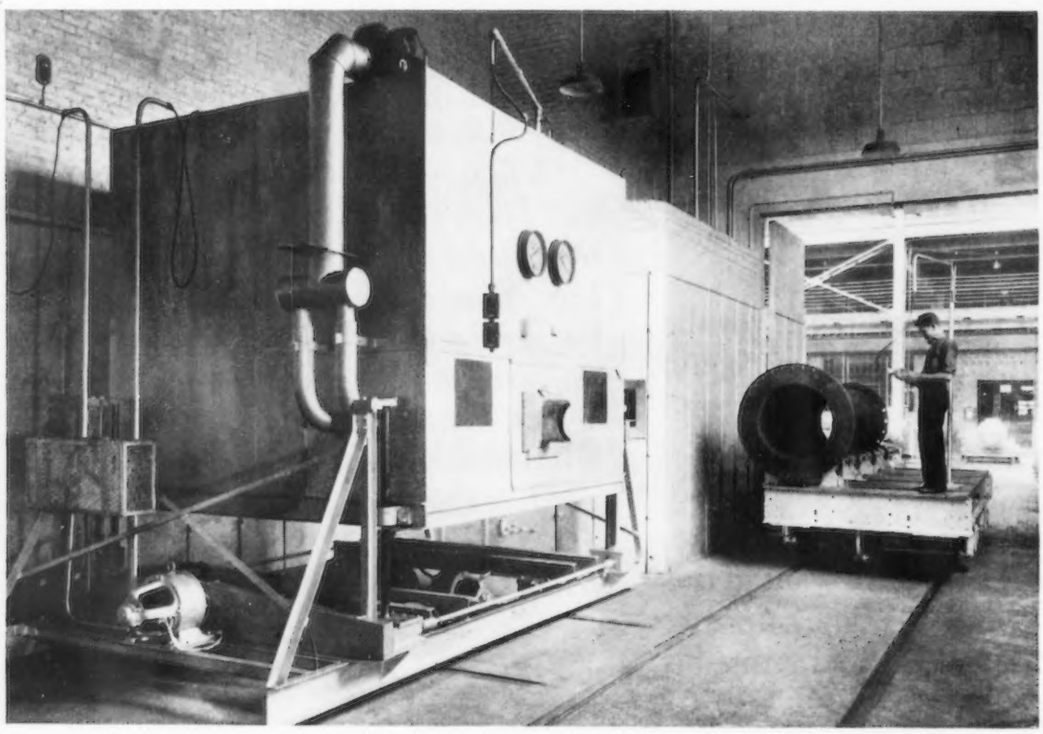
FOR some years, the South Philadelphia works of the Westinghouse Electric & Mfg. Co., has manufactured heat exchanger apparatus for power plants, petroleum and chemical industries, and for other industrial and marine applications. It is very often required that such apparatus be designed and manufactured to conform to the unfired pressure vessel section of the A.S.M.E. Boiler Code, or to similar codes promulgated by other engineering societies, insurance companies, the several States or by departments of the Federal Government.

Fusion welding is employed today to a very considerable extent in the manufacture of heat exchanger apparatus. The various codes referred to provide standard practice for the approval of welders and for acceptance tests in the case of vessels of the highest classes. It is required in the case of Class 1 vessels of the A.S.M.E. Code, and similar classes under other codes, that the longitudinal and girth seams be examined by means of X-rays, or the gamma rays of radium, to prove the sufficiency of the welding.

X-raying also provides an excellent non-destructive means of examining ferrous and non-ferrous castings intended for critical service; it is useful for the development of foundry technique and for the examination of automotive and numerous other mechanical parts.

To extend its field of service to industry, and to assure further the reliability of important parts in its manufactured product, the South Philadelphia works has installed a new X-ray laboratory, a brief description of which may be of interest because of several novel features.

It should be emphasized that the apparatus was designed primarily to permit the rapid examination of heat exchanger shells of cylindrical form,



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(Facing page)
Shutter plate of X-ray machine removed to show tube, which operates at 3 ma. and 180 kv., with a reserve up to 250 kv. Radiographs may be made in rapid succession without overheating of the tube.

(At Left)
View of X-ray room, showing X-ray machine, control room, and battery-driven truck transporting a welded cylinder from the shop. Complete push button control is a feature of the truck.

▼ ▼ ▼

Inspected Rapidly by X-Ray

By N. L. MOCHEL
and H. H. BATES

Metallurgist and Works Engineer, Respectively, South Philadelphia Works, Westinghouse Electric & Mfg. Co.

with or without flanges at the ends. Secondarily, it was desired to provide means for X-raying castings, nozzles, dished heads, and miscellaneous parts.

Westinghouse Diex Generator Used

The X-ray generator is a modification of the Westinghouse Diex, which will deliver up to 10 ma. of current to the X-ray tube at potentials as high as 220,000 volts. This assures ample X-ray penetration for the greatest thicknesses of material to be examined at this plant. The high tension transformer is constructed in two sections, and rectification of the high tension current is obtained by means of two thermionic rectifying tubes mounted horizontally above the transformer tanks. The regulation of variable technic factors, including current, potential and time, is provided for in a remote control panel located in the control room and connected to the transformers by a flexible cable leading to the X-ray cabinet. The X-ray tube is also mounted in the cabinet in a space adjacent to the transformers, the rays emerging in the horizontal direction from the front side of the cabinet.

As stated, the equipment was designed and built primarily to X-ray cylinders. Particular attention has been given to keeping set-up time as low as possible and at the same time maintain the best possible conditions for safety of the operator. Necessary protective devices have been installed so that it is practically impossible to injure anyone in the operation of this equipment, as the opening of any door leading to the X-ray room will shut down the equipment.

Battery-Driven Truck Operates Between Weldery and X-Ray Room

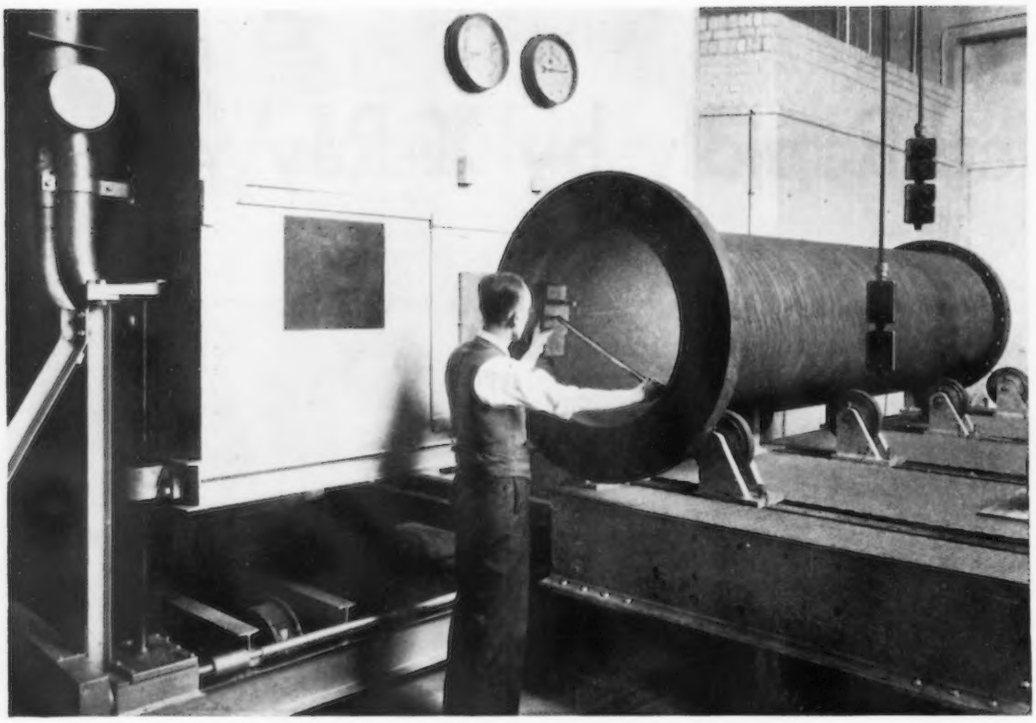
All the apparatus is installed within a room 25 by 45 ft. The general arrangement is shown in two of the accompanying illustrations. One corner of the room is walled off to form a control room for the equipment, and this room is readily convertible into a dark room for the developing of the radiographic films. A curtain of lead ¼-in. thick surrounds the room; it extends 10 ft. above the floor and is bolted to the walls with lead head bolts. The large doors leading from the main shop are of the swinging type with the same lead treatment. A window of lead glass is provided in the wall of the control room looking into the X-ray room. It is more than 1 in. thick and is opaque to X-rays to the extent of ¼ in. of lead.

A battery-driven truck operates between the welding shop and the X-ray machine within the room. It has a maximum speed of 20 ft. per min., and with a suitable push button control it may be slowed down to an almost imperceptible speed for accurate setting. On the truck are mounted two rows of rubber-covered wheels. The row nearest the X-ray cabinet is fixed with relation to the truck; it is motor driven and the wheels may be rotated in either direction. It is equipped also with push button control. The other row of wheels is made to slide transversely of the truck and can be located by a self-centering device in any one of six positions, depending upon the size of the cylinder to be X-rayed.

It is readily seen that two motions can be given to a cylinder resting upon the rollers; one a motion along the track and the other a rotative motion about the axis of the cylinder.

X-Ray Cabinet Has Two Adjustments

Resting on a track at right angles to the truck track is the X-ray machine itself. It consists of a frame or chassis mounted on wheels, the chassis having a vertical screw at each of its four corners. Each screw is driven by a worm and gear speed reducer. The screws on each side



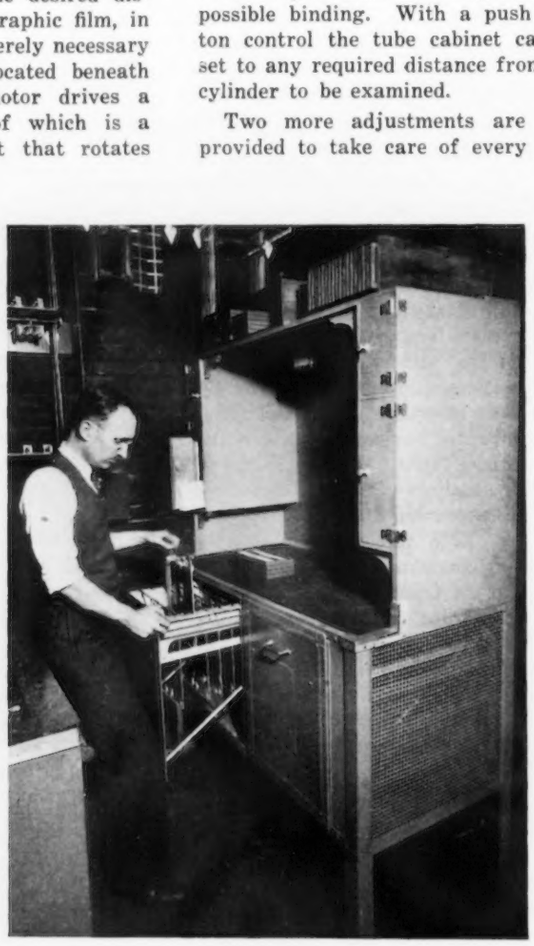
(At Left)
The cassette is set with a telescoping rod that is pointed at both ends and an inclosed spring holds it firmly in position. Focal gage, elevator gage, and copper plate with index numbers (used in adjusting the X-ray cabinet) are visible from the truck platform.

(At Top of Facing Page)
Westinghouse 250 kv. Diex generator with control and rectifying tubes inside the X-ray cabinet. The X-ray tube is in a lead lined compartment in the background. The milliammeter and X-ray filament meter in the far corner are visible from the control room.

of the X-ray machine cabinet are driven by a common shaft, and the two shafts are driven together by a single motor and two roller chains, one chain to each shaft. For each screw, there is a nut bolted to the frame of the cabinet that houses the X-ray generator and the tube. It is this device that raises or lowers the tube until its center and the cylinder axis can be made to rest in the same horizontal plane.

For the next operation, which is to set the tube center the desired distance from the photographic film, in this case 30 in., it is merely necessary to operate a motor located beneath the cabinet. This motor drives a gear in the center of which is a spherically seated nut that rotates around a screw. The opposite end of the screw is connected to the cabinet frame by a universal joint. Flexibility seemed necessary to avoid possible binding. With a push button control the tube cabinet can be set to any required distance from the cylinder to be examined.

Two more adjustments are thus provided to take care of every posi-

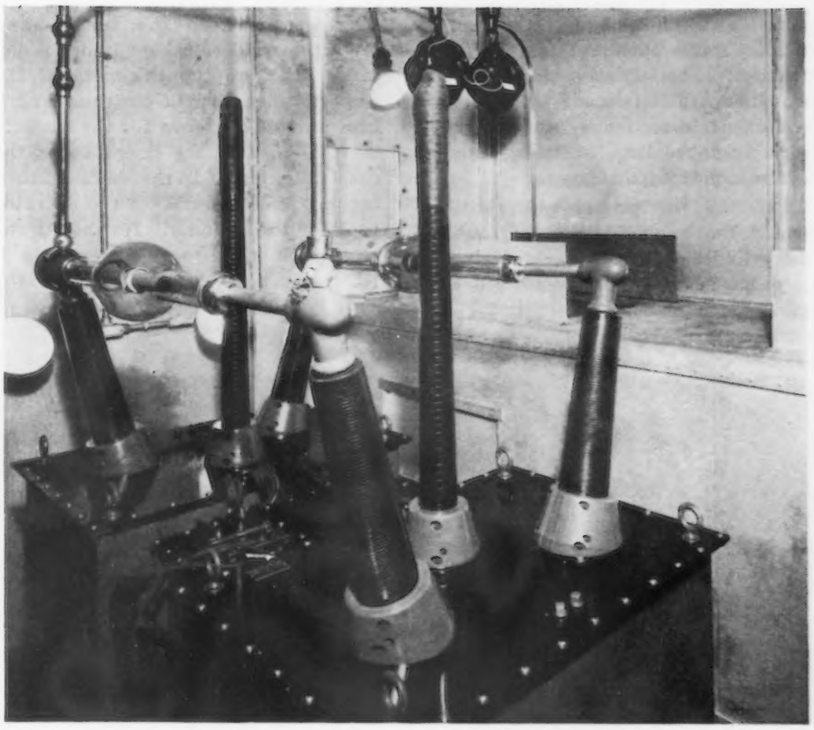


tion of the tube relative to the cylinder. The motions, four in all, may be summarized as follows:

1. Movement along the longitudinal seam by moving the truck.
2. A rotative motion for setting the longitudinal and peripheral welds, which is also taken care of on the truck.
3. Elevation of the tube to the horizontal plane of the cylinder axis—done by the elevating screws on the tube cabinet.
4. Spacing of the tube with respect to the cylinder by means of the fore-or-aft motion of the cabinet itself.

All these motions are controlled by the operator, through push buttons, while standing on the truck.

At the bottom of the cabinet on the side nearest the truck is the compartment containing the X-ray tube. This compartment is lined with lead ⅜ in. thick. Back of it and within the cabinet is placed the Diex generator.



Indicating Devices Reduce Setting-Up Time

Very interesting features of the installation are the indicating devices for setting-up the work.

First, the operator measures the inside diameter and wall thickness of the cylinder to be X-rayed. He then obtains from a chart mounted on the front of the cabinet an index number for setting the transversely adjustable wheels on the platform of the truck. Next, he sets these wheels and places the cylinder to be X-rayed upon them.

This done, the operator refers to the same chart for another index number, and then sets the elevator adjustment indicator to this second number by pressing the push button to raise or lower the cabinet as the case may require. Once made, this adjustment is not changed while X-raying either longitudinal or girth welds of a given cylinder.

The equipment is simple. The elevator adjustment dial consists of a pulley 12 in. in circumference which drives the indicating pointers. The pulley is counter-weighted to return the pointers in a counter-clockwise direction. A steel piano wire is passed around this pulley and over other pulleys, and anchored to the chassis of the cabinet. When the cabinet is raised, the wire pulls the pointer in a clockwise direction and when the cabinet is lowered the counterweight rotates it in the opposite direction.

▲ ▲ ▲

(At Left)
Standing at the controls, the operator peers through a lead-glass window to observe the meters while X-raying welded cylinders.

(Middle)
Located in the control room, the film dryer contributes to quick inspection of weld radiographs.

(At Right)
With developing tanks in the control room, radiographs may be inspected within a few minutes and, where necessary, retakes may be made immediately.

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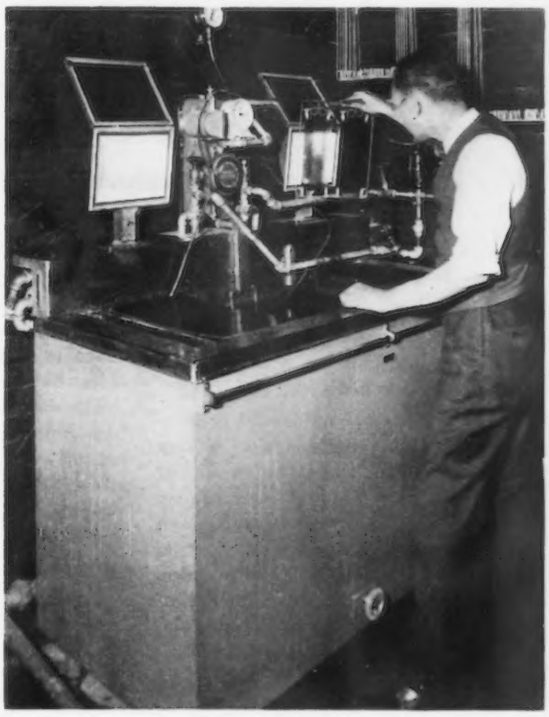


Simple Focal Adjustment Indicator

The indicator for focal adjustment is equally simple. A pointer located at the side of the X-ray cabinet is connected to a dial indicator that is similar to and is located beside the elevator adjustment dial. The pointer is arranged so that it may be moved to and from the X-ray cabinet. When it is moved back toward the cabinet, by means of the counterweight, the dial indicator shows a minimum reading. The pointer is moved outward from the cabinet and made to touch the cylinder to be X-rayed by pulling downward on the push button cord, which is connected to the pointer by a cable that passes over suitable pulleys. This pointer is located in the

same horizontal plane as the center of the X-ray tube and axis of the cylinder. The indicator on the focal adjustment dial is made to rotate in a clockwise direction by a steel piano wire arranged over suitable pulleys and attached to the pointer.

Pressing the proper push button causes the cabinet to move toward the cylinder to be X-rayed. This, in turn, pushes the pointer toward the cabinet and causes the indicator on the dial to rotate counter-clockwise to an index number that had been obtained previously from another chart on the front of the cabinet.

From this point on, the operation of setting the cassette containing the sensitized film and screen is similar to other X-ray work. The setting-up time for each cylinder has been reduced to about 1 min.

Unique Holders for Cassettes

Other devices worthy of mention include the holders for cassettes. When X-raying horizontal seams, a board with spacing strips on each edge is clamped inside the cylinders with the spacers spanning the weld. The spacers keep the board away from the inside of the cylinder a distance equal to the thickness of the cassette plus a small clearance. They also provide a groove for the cassette to slide in, and the board keeps the cassette adjacent to the shell. It then becomes unnecessary for the operator to enter the cylinder. He inserts the cassette in the groove and pushes it to the proper location within the cylinder with a measuring stick already laid off in film lengths; and he removes them in the same way.

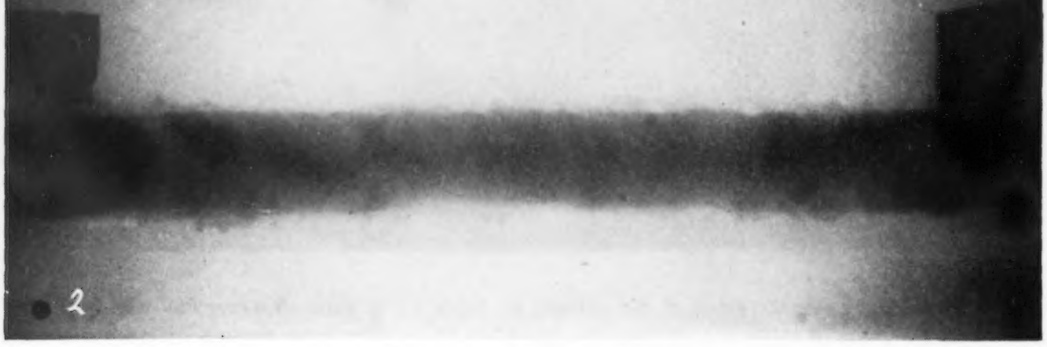
For girth welds, which are usually near the ends, he places the cassette in position and holds it with a spring loaded telescoping device.

As with many industrial operations, the time required for setting up work is often more than that for performing it. This is particularly true with X-raying castings and welds with usual devices. Reduction of setting-up time was kept in mind constantly during the development of this machine. All controls are located conveniently so that the operator can stand in one place and perform every setting-up operation. He is given perfect control of his work with clock-like indicators. He is absolutely safe from all radiations and reradiations of the rays. All data on voltage, milliamperage and exposure time are carefully charted; hence, a duplication of results is readily obtainable.

Control Room Combines Dark Room

In the control room, which is convertible into a dark room by closing the doors and one shutter over the window, the operator performs the work of developing, fixing, and drying films. Hot, cold, and iced water are at hand, and the temperature of the baths is controlled automatically. The dark room is well ventilated with a light-proof ventilator and fan. Every convenience is afforded for ease of operation, speed, safety, and comfort of the operator.

A turntable in the shop outside the X-ray room provides means for reversing the truck, and placing into position before the tube opening that side of the truck table that is free of the rubber-covered wheels. This provides ample space for quickly placing



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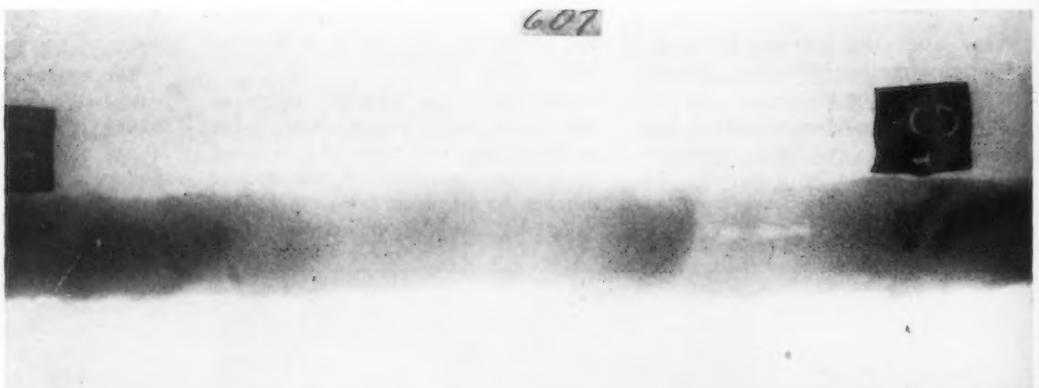
Radiographs typical of results secured with the new equipment installed at the Westinghouse South Philadelphia works for examining welded heat exchanger shells are shown at left and below.



The radiograph above (617) shows an acceptable weld in 1⅜-in. material. The one at the right (607), of material of ⅝-in. thick, shows porosity and slag inclusions in the weld.

▼ ▼ ▼

nozzles, dished heads, castings, or other parts in position for X-raying.

A stand of special design has also been provided for X-raying test plates or test samples. Being roller-mounted, it may be rolled into position before the tube. A very flexible clamping arrangement permits test plates of any size to be readily placed in position for X-raying, and the cassettes slide into position behind the test plate, much as the plate holder slides into position in the photographer's camera. As test plates play a very considerable part in most welding experiments and developments, this feature is quite important.

Sheet steel cassettes (film holders) with bakelite front, and removable back with flat spring retainer, and double intensifying screens permanently mounted to front and back, are used. A 4-in. by 10-in size has been found convenient for girth seams and a 3½-in. by 17-in. size for longitudinal seams.

Radiographs typical of results secured with the equipment described above are included in the illustrations accompanying this article.

Very Small Specimens X-Rayed

A method for X-raying very small specimens has been devised. When inspecting old boilers or shells, it is often possible to burn out or drill out a piece 2 or 3 in. in diameter for test purposes. Even smaller pieces have been examined. By casting such specimens into a sheet or plate of lead or lead-base babbitt, of approximately the same thickness as the test specimen, so that the specimen is completely surrounded by the lead, and supporting this sheet or plate in the special stand referred to above, the specimen may be exposed to the rays and excellent results obtained. In the resulting radiographs, the image of the test specimen appears very plainly in an otherwise transparent film. Two or more test specimens may be cast into the same plate and examined at the same time.

The equipment described above has been in service for about six months. It has behaved excellently, and the results have been very satisfactory. The ability of the tube to operate continuously for long periods of time and the ease of operation and freedom from physical and mental fatigue on the part of the operators have been noteworthy.

Sprays Metals to Repair Cavitation Damage

TO DETERMINE the practicability of repairing cavitated water turbine runners by means of the metallizing, or metal spraying, process, an impressive experiment was made by the Metallizing Co. of America, Inc., Los Angeles, amounting to applying seven different types of metal to the worn spots and examining the results after a year's operating wear. By this procedure the practicability of the process as a whole was regarded as definitely demonstrated and a determination made of the metal or alloy best suited to the purpose.

For the test, a runner of unit No. 4 of the Cohoes hydro-station of the New York Power & Light Corpn., a subsidiary of the Niagara-Hudson system, was chosen. The accompanying illustration shows the eroded or cavitated corners of the runner. The depressions were filled up by metallizing, a different metal being used for each blade, as stated. The turbine was one of the Francis type, built for a head of 96 ft., and had 15 cast iron buckets. The turbine was made by the S. Morgan Smith Co., York, Pa.

The metallizing was done from Oct. 18 to 21, 1932, with the turbine in place and the unit therefore not dismantled. On Oct. 23, 1933, the buckets were inspected and the behavior of the spray deposited metals was observed to discover how they withstood a full year of the cavitation effect. For spraying, the metallizer made by the Metallizing company was used, a portable gun that receives a given metal in wire form and melts and sprays it on the material to be covered. The repair work was supervised by R. E. Summers, superintendent of the power station, and R. A. Axline, engineer for the Metallizing company.

The cavitated parts were prepared for the metallizing by sand blasting, using a 200-lb. sand blast with 16 to 20 mesh hard silica sand. Approximately 10 min. sand blasting time sufficed for each bucket. The cavities were approximately 8 sq. in. in area and varied from ¼ to ¾ in. in depth. There were two cavities in each runner. The accompanying table gives the particulars of the metallizing.

The inspection at the end of the year was made by Mr. Summers, who reported as follows:

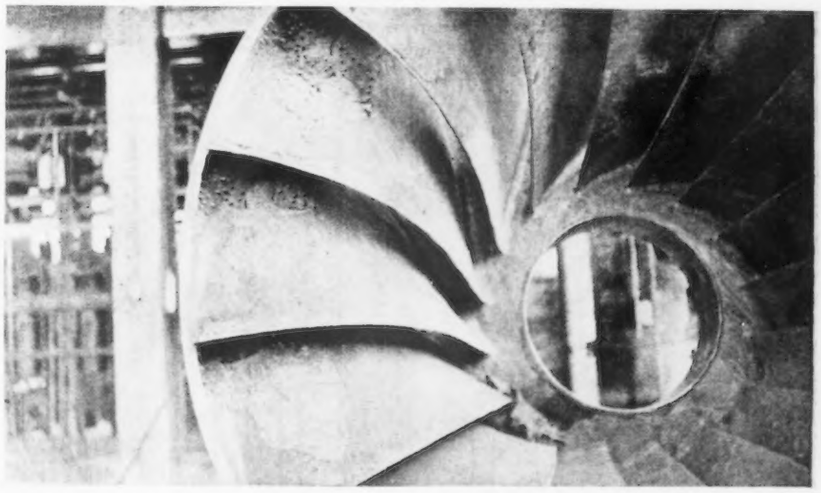
No. 2 bucket metallized with zinc. Found this metal half gone.

No. 3 bucket metallized with bronze. This metal looks good, no sign of water action, small hole in the metallized work approximately ½ x 1 x 2 in.

No. 6 bucket metallized with aluminum. Found this metal half gone.

No. 11 bucket metallized with copper

(Concluded on Page 76)



Cavitation repairs to this water-turbine runner, which drove a 7200-kw. General Electric alternator, were made by the Metallizing process. The cavities were approximately 8 sq. in. in area and as much as ¾ in. deep.

Rationalization of Manual Labor

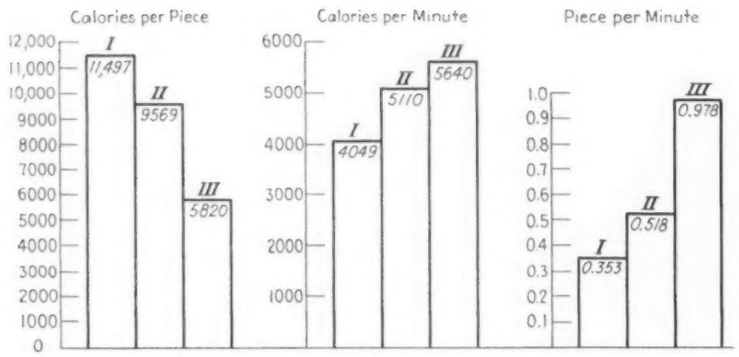


Fig. 1—Record of the results of an experiment in industrial physiology on the molding operation.

Fig. 2—Record of results of an experiment on the molding operation in which the sifting of the fine sand was performed with a pneumatic shaking device.

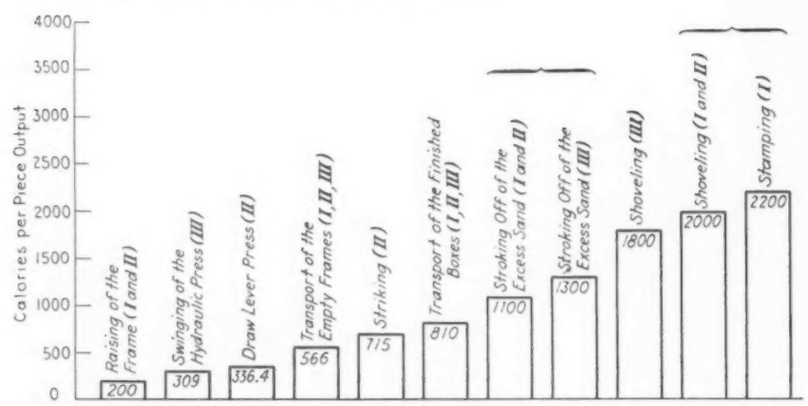


Fig. 3—Record of results of an experiment in industrial physiology on the separate manipulations in the molding operation.

IN the experiments that have been performed to date on the expenditure of energy during work, the object in view has been in most cases an increase in the output of work by the elimination of inappropriate, unnecessary and time-robbing movements; in other words, better performance with the same expenditure of time.

The experiments on the consumption of energy in the operation of molding, which Dr. Ernest Simonson, the director of the Industrial Physiology Depart-

SINCE it is mainly manual labor that one has to deal with, the expenditure of energy is obtained by the determination of the number of calories consumed. To do this the amount of oxygen taken in by the worker, the amount of carbon dioxide given off and the amount of air used in the process are ascertained. For this purpose a so-called respiration apparatus was employed, in which the main current of used air passed through a gas meter, thus measuring the amount of air used, while small portions were caught up in small rubber bags adapted to this end for chemical analysis.

As subject for the experiments a healthy worker was chosen who on account of several years' experience was able to perform the manipulation in the investigation with the same expenditure of energy as usually found in practice. His consumption of oxygen while at rest was first ascertained and thus values for later calculation and reference were obtained. Experiments, in which a stamping machine (process I), a lever press operated by

By Industrial Physiology

By RENE LEONHARDT
Berlin (Germany)

ment in the Social Hygiene Research Board, Frankfort on Main, carried out in the foundry of the firm of Bamberger, Leroi, Frankfort o. M., show that the better performance which rationalized management boasts of is obtained at a cost of increased expenditure of energy (body fatigue) per unit time on the part of the worker. These results are not universally true for every kind of work. Each individual case must be tested by itself by the application of the highly illuminating, objective methods of industrial physiology.

hand (process II) and a hydraulic press (process III) were employed, were carried out to find out the total calory consumption per unit of time and per unit of work. Process I consisted of 20 separate movements, process II of 16 and process III of 13. The number of calories needed for each move was ascertained in order to determine for which manipulation it would be expedient to replace manual labor with machines.

The results of the experiments are recorded in Fig. 1. By this diagram one learns that technical rationalization in the processes I, II and III leads on one hand to a reduction in the amount of energy consumed per piece from 11,497 cal/piece to 5820 cal/piece in spite of an increase in production from 0.353 pieces/min. to 0.978 pieces/min. On the other hand, it causes a rise in the expenditure of energy per unit time from 4049 cal/min. to 5640 cal/min. The increased efficiency obtained with the aid of better technical equipment was able to be attained only by a greater demand upon the worker.

Fig. 2 further shows that process II must be marked as inferior to process III from the point of view of industrial physiology. The amount of energy needed in process II is not much less than that required in process III (5110 cal/min. to 5640 cal/min.) in spite of the fact that it produced only half as many pieces as process III (0.518 pieces/min. to 0.978 pieces/min.).

When in the processes I and II at the sifting of the fine sand manual labor was replaced by a pneumatic shaking device there resulted an increase in the output and a reduction in the expenditure of energy per piece output (in all three processes); see Fig. 3.

The results that were got in the investigation of the individual movements and which are recorded in Fig. 3 are worthy of notice. One sees that the pounding operation in process I requires the highest expenditure of energy, namely, 2200 calories/pieces while the same work in process II (molding with the lever press) demands only 338.4 cal/piece. The shoveling of sand into the molding boxes, the setting up of the empty boxes, the removal of the filled boxes, as well as the stroking off of the excess substance in the filled boxes, require a great amount of energy.

Fig. 4 shows even more clearly what part of the total energy consumption these separate operations take. It is seen that in the very efficient process III the subordinate work consumes 76.9 per cent of the total energy, so that the performance of this auxiliary work by a helper to the relief of the molder is a matter to be considered.

The investigations of Dr. Ernest Simonson, who recently became director of the institute of industrial physiology, Narkomtrud, at Charkoff, U. S. S. R., show that even today it is possible to increase the efficiency of the worker by the application of the methods of industrial physiology without making any greater demand on him than at the times of the lower efficiency. The main requisite is only the elimination of energy-consuming subordinate operations and their replacement with machines.

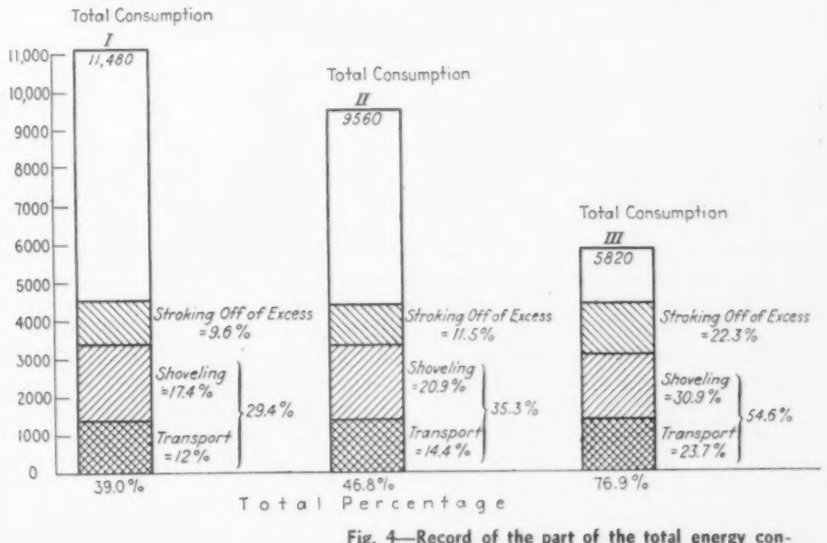


Fig. 4—Record of the part of the total energy consumption the subordinate work takes in the molding operation.

Free-Machining Corrosion-

One of the electric furnaces (6-ton) for melting Bethalon.

By EDWIN F. CONE

SEVERAL methods of producing free-machining corrosion-resisting steels have been made public but they all have for their common object the introduction of at least 0.30 per cent of sulphur. One company is said to substitute a certain amount of selenium for sulphur and there are other methods to accomplish the introduction of the sulphur or its equivalent. It can be stated, however, that essentially it is the sulphur content which bestows the free-machining properties and not some other added element. It is established that sulphide of chromium is present in quantity.

Two special brands are produced by the Bethlehem company, under the trade names: Bethalon A and Bethalon B. The type analyses and physical properties of these two brands are given in the table. Besides these two main brands there is also a special Bethalon D which is the same as the A type except that it contains 21 per cent chromium instead of 13 per cent. Another special brand is Bethalon C which has 20 per cent nickel and about 10 per cent chromium. Each of these two special brands can be made to suit unusual conditions.

The function of the MoS_2 is to introduce the sulphur but the latter can be and often is brought into the composition by a straight addition of sulphur itself or by iron pyrites. These steels are all made in electric furnaces, usually the arc type.

Actual analyses of heats of the A and B types are as follows:

	A*	B
	Per cent	Per cent
Carbon	0.09	0.12
Manganese	0.37	0.22
Sulphur	0.40	0.35
Phosphorus	0.012	...
Silicon	0.49	...
Chromium	12.48	18.60
Nickel	Trace	9.86

* See Chart

Properties of Bethalon A and B

Taking up the various special properties of Bethalons A and B, it may be stated that the A type, as to corrosion-resisting properties, has all those characteristics of straight carbon-chromium irons. The B type has all the excellent corrosion-resisting properties of the regular straight 18 and 8 brand. It is recommended for uses where the rapid performance of intricate machining operations is important. It must, however, be machined at a somewhat lower speed than screw stock. The cutting speed is to some extent dependent on the type of screw-machine used, but speeds from 80 to 90 surface ft. per min. can be maintained without the necessity for too frequent regrinding of tools.

The A brand or type can be drilled, turned, bored or threaded as easily as ordinary screw stock with the same tool set-up and the same feed, speed, and depth of cut. Excellent threads can be cut at 150 to 175 surface ft.

Resisting Steels for Many Uses

per min. It can be smooth turned at 200 surface ft. per min.

Of decided value are the heat-resisting properties of Bethalon A. In parts subject to a heat up to 1100 deg. F., it remains practically scale-free and retains great strength up to that temperature. Where maximum strength and absolute freedom from scale are not essential, it can be used up to 1400 deg. F. This type can also be easily and quickly ground, taking an excellent finish without heating or loading the wheel. It can be rapidly polished, taking a bright lustre.

UNTIL the introduction of the high-chromium or chromium-nickel steels, the only free-machining steels were the ordinary carbon, high sulphur screw stock brands. These were satisfactory for many purposes, and still are, but they will not stand up where corrosive and other conditions are a serious factor.

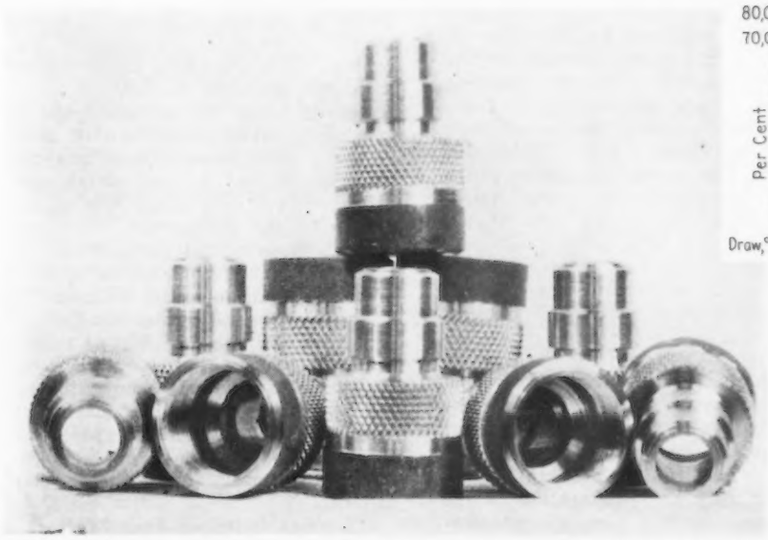
To meet the demand for a free-machining material which would stand up during operations involving severe corrosive conditions there are on the market several high-chromium and high-chromium-nickel free-machining steels. Among these are the various brands made by the Bethlehem Steel Co., Bethlehem, Pa.—The Author.

Forged at Higher Temperatures

Forgings can be produced from both A and B brands. The A brand is usually forged at somewhat higher temperatures than those at which ordinary corrosion-resisting steels of that composition are forged. The maximum forging temperature for both brands is 2300 deg. F.

A feature of the A type of these free-machining steels is that it can be hardened by quenching in oil at from 1750 to 1850 deg. F., followed by drawing to suit the purpose for which it is intended. The chart clearly shows the proper drawing temperature to acquire the Brinell hardness desired. The physical properties are also given for the various drawing temperatures. It will be noted that drawing temperatures up to 1000 deg. F. may be employed without decreasing appreciably the tensile strength or elastic limit.

It should be added that for use in the manufacture of electrical equipment the specific electrical resistance of the A free-cutting steel is 17 as compared with 45 for hard steel, 18.9 for lead, 15.9 for soft steel, 11 for iron and 1.6 for copper. Of course the B type is non-magnetic in its



AN assortment of products machined from Bethalon.

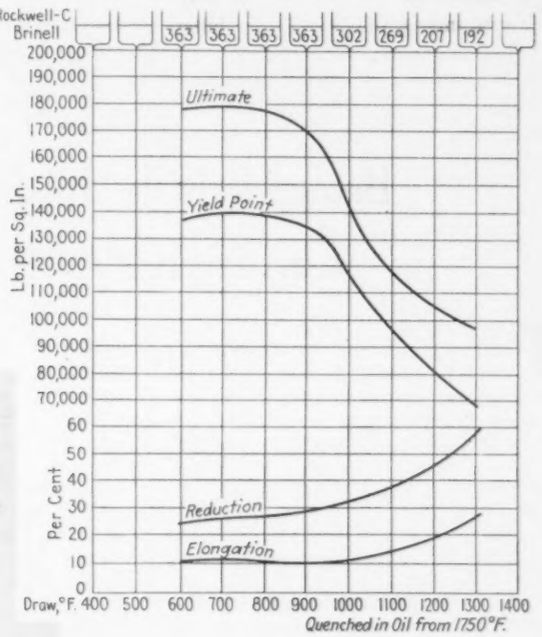
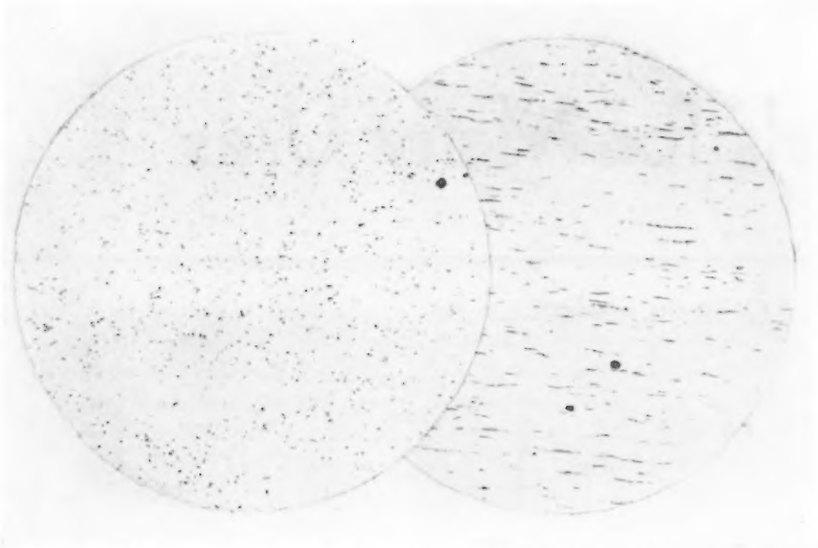


CHART showing physical properties of Bethalon A. Brinell numbers are included.



Photomicrographs of a sample of Bethalon showing size and distribution of the sulphide inclusions. One is from a transverse (left) and the other a longitudinal (right) section of a rolled bar. Both are at 100 diameters. Unetched.

Table of Composition and Physical Properties of the Bethalon Steels

	A*	B†
Carbon	0.11	0.13
Manganese	0.30	0.30
Chromium	13.00	18.00
Nickel	...	8.00
Molybdenum Sulphide (MoS_2)	0.50	0.50
Yield point, lb. per sq. in.	43,000	57,000
Ultimate per sq. in.	74,000	95,000
Elong. in 2 in. per cent	30.0	35.0
Reduction of area, per cent	50.0	45.0
Brinell harness	156	152
Specific gravity	7.777	7.89
Coefficient of linear expansion:		
Between limits of 36 and 100 deg. C.	0.0000109	.. ..
Between limits of 36 and 1,000 deg. C.	0.0000136	.....
Between 36 and 200 deg. C.	.....	0.0000175
Between 36 and 500 deg. C.	.....	0.0000186

*Physical properties in the annealed condition.
†Physical properties in the fully softened condition.

fully softened condition; it has a permeability of about 1.04.

Photomicrographs are reproduced showing the distribution and general shape of the sulphide inclusions in Bethalon A. There is also the reproduction of a photograph of highly machined parts made from one of these free-cutting corrosion-resisting steels.

It should be stated that the pouring into ingots, the rolling into billets and so on follows the usual procedure for such steels. Both the A and B brands are available in the following forms or conditions: Annealed bars within bar mill sizes; ground bars, ¼ in. to 3-in. round; cold-drawn bars; heat-treated bars; forging billets; drop forgings; press forgings; wire rods and wire.

It can thus be realized from the foregoing discussion of this type of steels that here is available a steel which can be freely machined into all manner of products and that they can be used in corrosive and heat-resisting conditions as well as in other applications to which the ordinary screw machine or free-cutting steels would not stand up.

Broad British Studies of Corrosion Problems

THE intensive study being made of corrosion is well exemplified by what is known as the second report of the corrosion committee presented to the recent meeting of the Iron and Steel Institute in London, June 1. It amounts to a volume of 298 pages of the regular size of the institute's proceedings and withal is in reality merely a record of progress since the first report was published in 1931. The committee is a joint body of the Iron and Steel Institute and the British Iron and Steel Federation, comprising some thirty experts in all the branches of the subject from pure scientific investigation to the study of the behavior of finished structures.

Field Tests All Over the World

For so-called field tests 14 corrosion stations have been set up in the British Isles and at Singapore and in Nigeria, South Africa and northern Sweden, to establish case histories under widely varied climatic conditions. The first series of tests is concerned with the corrosion of ordinary mild structural steel, both unalloyed and with the addition of 0.2 and 0.5 per cent of copper respectively. For this purpose, three complete 3½-ton ingots were taken from a 250-ton heat made in a basic-lined tilting furnace, which was poured into three separate 75-ton ladles; the necessary quantities of copper were added to two of the ladles. In this way, three steels were obtained in which the copper content was the only appreciable variable, the casting conditions and rolling procedure being otherwise identical in all respects. Companion ingots to those used for the production of the test samples have been examined by the committee on the heterogeneity of steel ingots, and full details of the melting and rolling procedure were taken during the preparation of the specimens, so that complete information on any sample is available.

The effect of copper, as such, is, however, only one feature of this series of tests; in addition, the effect of surface condition is being investigated. One of the most important factors under this head is the character of the mill scale, which, as is well known, may be profoundly affected by variations incidental to the normal commercial processes of hot-rolling. The committee has therefore arranged, not only in this, but in all series of tests, to conduct tests on specimens rolled under two or more different conditions, which are accurately defined by pyrometric and other observations taken during the rolling of the specimens. The committee's tests should therefore throw light on the different characteristics of rolling scales on steel, whether unalloyed or copper-bearing. Further, in order to eliminate the effect of rolling scale, specimens that have been descaled by various treatments, including pickling, sandblasting, machining and polishing, are also exposed, so that a comparison of the materials is made in several different surface conditions.

(Concluded on Page 78)

How Attractive Finish Helps Metal Products Sales

20—The Preparation for Paint

THE preparation of a metal surface on which a paint or enamel is to be applied is a vital factor in the life and service of the coating, and the quality of the paint itself often may be of less importance in the final result than the quality of the surface preparation. Improved technique in prepainting treatment has extended the use of the corrodible metals as well as the use of paint in the metal working industry.

Some of the features of such surface preparation are described in this twentieth article of an extended series on metal finishing.

WOMEN, generally, are supposed to have little interest in metallurgy, but the automobile has brought many changes in society, and today it is not unusual to hear even the feminine purchaser ask, "Are the fenders of this car protected against rust?"

Gradually the buying public has become rust conscious, until now, as never before, rust-proofing is a strong selling factor in the steel products industry, even though the process frequently is hidden under a coating of paint or enamel. Rust-proofing and preparing for paint in the treatment of steel surfaces are often identical processes, for almost always a good rust-proofing treatment produces an etched surface which affords an excellent base for paint.

The proper application of paint to any metal product involves as a fundamental process, preparation of the metal surface to receive the paint. In the public mind, first consideration is given to the quality of the coating material itself, but manufacturing experience demonstrates that paint failure on metal products is more frequently caused by improper preparation of the surface, than by the use of inferior coating materials.

Plain polished sheet steel is not of itself an ideal paint base. Unlike wood, it lacks porosity to permit penetration, and so, when untreated, paint for the most part will simply lie on the smooth glass-like surface and, no matter how adherent it may seem when applied, the bond is not secure.

In addition to this lack of bond, the smooth steel surface presents another disadvantage as a base for painting, because with the admission of moisture to the metal through any cause, either through porosity of the paint film or abrasion of the coating, a condition favorable to corrosion tends to develop and, once started, such a condition favorable to corrosion tends to spread. The outward sign may be a tiny spot of rust, but a pernicious activity may set up under the paint and, if allowed to progress, whole sections of the coating will become detached.

Fig. 1—Diagram showing electrochemical theory of corrosion.

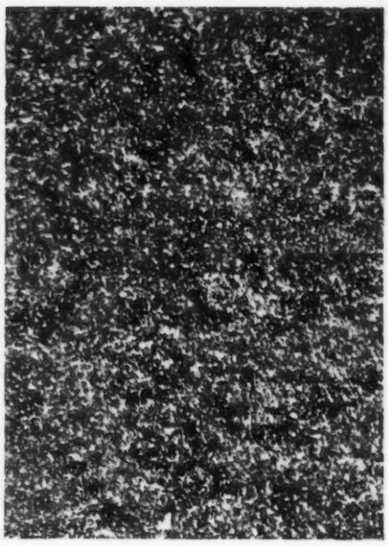
Alkaline Reaction

Whatever theory of corrosion is accepted, laboratory research has established the fact that in addition to the visible growth of rust at the point of actual abrasion, the surrounding area develops an alkaline reaction which creeps back between the metal and the applied finish, neutralizing the adhesion over an ever-widening surface.

R. R. Tanner, Metal Finishing Research Corpn., in his extensive work in this field, has confirmed the fact that when a piece of steel is strained, certain parts of it become electro-positive and other parts electro-negative. This condition may be demonstrated by tests, for the surface area in some parts will give a strong ferrous iron reaction, and in other parts, an equally strong hydroxyl ion or alkaline reaction.

When these respective areas are immersed in agar-agar jell, to which has been added potassium ferricyanide and phenolphthalein, a blue color develops where the ferrous iron dissolves, and a pink develops where the surface is alkaline. This relatively simple test indicates several things. First, it proves that there is a condition favorable to corrosion, and second, it indicates a method of cleaning steel for paint which should be avoided. When a bare steel sheet is treated with most any kind of acid before subjecting it to this test, the concentration of alkali is greater than for a similar sheet untreated with acid.

This seems strange at first, but when it is realized that any pickling



Comparison of Plain and Treated Steel. Total micrograph enlarged 100 times.

Fig. 2A (Right)
Plain polished carbon steel sheet.

Fig. 2B (Left)
The same material with chemically produced phosphate coating.

effect tends to cause iron to dissolve more rapidly, the increased concentration referred to seems more logical. It is well known that most pickling, without subsequent treatment, leaves iron in a favorable state for corrosion. When a steel sheet is dipped in a five per cent phosphoric acid solution and then placed in agar-agar jell, a blue color appears almost immediately, indicating solution of the iron. Under such a condition it usually takes longer for the pink color to show up on the sheet because the hydroxyl ion must first neutralize the hydrogen ion from the acid remaining on the surface of the sheet. When this neutralization has once taken place, the phenolphthalein indicator turns decidedly red.

In Fig. 1, A and B indicate two small pieces of sheet steel connected by a wire and immersed in a water solution of any salt which will give the solution a slight conductivity. This is the diagram suggested by Mr. Tanner to illustrate the electrochemical theory of corrosion.

If we assume that both A and B are neutral, then if corrosion is to take place, some iron must dissolve, which means that hydrogen gas is liberated at the metal surface. If such corrosion takes place on A, for instance, the iron which dissolves takes into solution with it two positive charges for each iron ion, and this leaves a negative with respect to B, due to the fact that it is left with more negative charges than positive, and since the two pieces are connected by a conducting wire, a circuit is formed through the wire, with its return through the solution.

Since B is now a positive electrode, any hydroxyl ions migrate to this electrode and a fairly high concentration of alkali is established. If the connecting wire is severed between A and B, the current cannot flow, of course, and corrosion from this source ceases.

This illustrates one of the important features to be developed in preparing a metal surface for paint. If by some means the positive and negative areas on the surface can be insulated, one from the other, the effect will be like severing the wire in the illustration shown in Fig. 1, and the

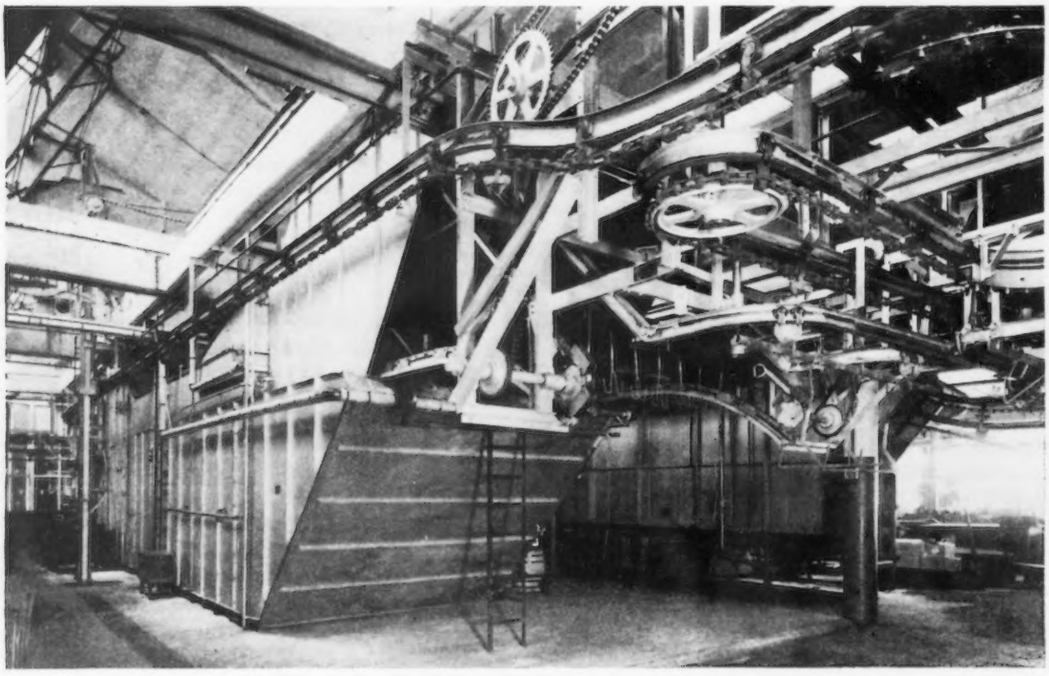
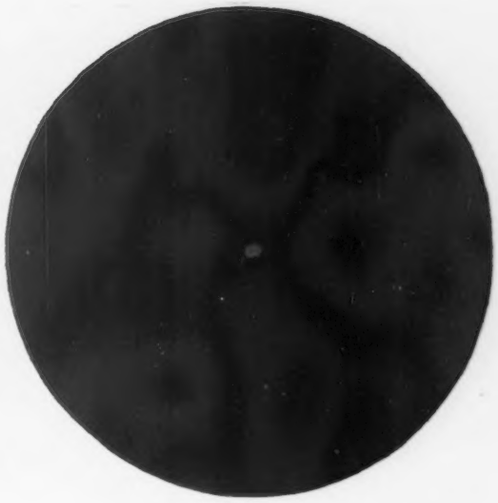


Fig. 3—This typical modern equipment, used for preparing steel products for enameling, illustrates the extensive auxiliary equipment in this field of manufacturing.

Comparative Life of Plain Steel and Waterproofed Steel Under Enamel.

Fig. 4A (Left) Plain carbon steel with baked enamel coating after salt spray test

Fig. 4B (Right) Same steel coated in the same way and subjected to the same test, but rust-proofed before enameling.



tendency to corrode will have been retarded.

Two Important Factors

There are then two important qualilties to be sought in preparing for paint:

1.—Etching or roughing, to provide a foothold for the paint.
2.—Surface insulating, to prevent electrochemical development of alkali.

Both of these objectives may be attained in a single operation between the cleaning and finishing of metal. One method is to create a phosphate coating which gives greater adhesion and at the same time arrests the flow of an electrical current. The effect of such a coating on steel is illustrated by Figs. 2A and 2B. These are photomicrographs, each taken at 100 diameters. Fig. 2A is a piece of polished but untreated cold-rolled steel. Fig. 2B is a similar piece which has been treated with a typical phosphate coating.

In this case a Bonderite coating was used. Tests show that such treatment before painting will stop the spread of rust underneath the paint film, even when the paint is scratched sufficiently to allow local corrosion to take place. If such a treated specimen is placed in the agar-agar jell previously referred to, there will be practically no color to indicate either ferrous iron or alkali.

Even though rust itself tends to loosen a paint film, the alkali formed as the result of the corrosion of metal is more pernicious and causes more pronounced loosening of the paint than does the rust itself. Figs. 4A and 4B illustrate another test. Here two identical pieces of steel were taken. Both were cleaned. The one in Fig. 4A was untreated, and the one in Fig. 4B was given a Bonderizing treatment. Both pieces were then covered with two coats of baked enamel and afterward each was pricked at the center to expose the metal. Both were then subjected to 228 hr. in a salt spray.

The light area in Fig. 4A shows where alkali has destroyed the paint film surrounding the abraded spot. In Fig. 4B slight rust appears at the point of abrasion, but no spread of corrosion or alkali in the surrounding area is apparent. The process of Bonderizing, as with some other phosphate coatings, consists of a chemical action on the metal itself, in which

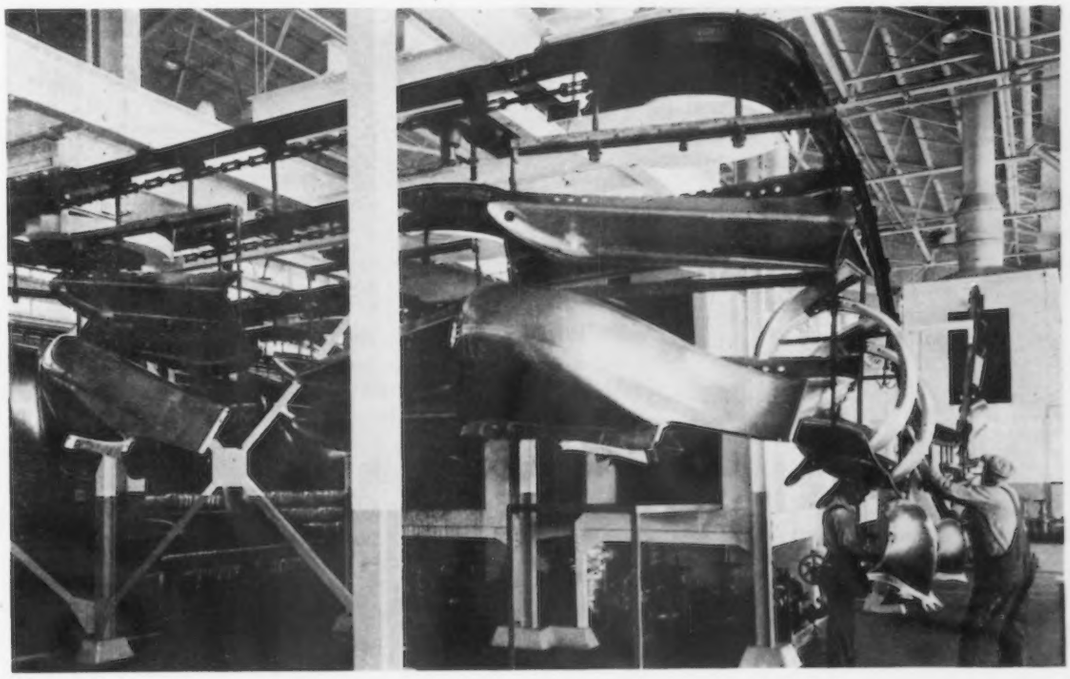


Fig. 5 — Automobile parts are here being conveyed to bonderizing tanks in a continuous preparation and painting process.

a microscopically thin portion of the surface is converted to a minute crystalline structure. In the subsequent application of paint, the fluid permeates the crystals and, when dry, is securely keyed to the metal.

Figs. 6A and 6B show two shallow receptacles containing the agar-agar jell referred to above. In the one in Fig. 6A a small piece of untreated steel is placed, and in Fig. 6B is placed a similar piece of identical steel, but provided with a phosphate coating. The dark spots in Fig. 6A indicate the blue development where iron has dissolved. The gray portion of the piece was actually a decided pink, indicating alkali. No dark spots are visible in Fig. 6B, and the small piece of steel showed no blue or pink areas, indicating that no corrosion had set up on the surface.

Rust-Proofing

Rust-proofing is so closely identified with painting and enameling that it may in general be considered as a means of preparing metal for paint, and some of its chief characteristics will be considered here. For many years the rusting of iron and steel was ignored as far as possible. The steel manufacturers themselves certainly did not want to call attention to it, and fabricators of metal products realized that any aroused public sentiment on the subject of rusting might have the effect of increasing the cost of production by forcing them to turn to some non-rusting materials.

So, ignoring as much as possible the fact that untreated steel might rust, paint was used in ample fashion. This was something like an ostrich burying its head and thinking all would be well. As soon as scratches appeared in the paint, there was an opening for rust to start, and corrosion then spread under the paint coat. Even high class automobiles previous to 1915 were subject to spreading corrosion if the surface were scratched or bruised. One result of the stock-taking period just after the war was the directing of public attention to the tremendous losses due to rust. Figures were published widely, giving the estimated yearly loss in dollars, and most of these estimates ran upward from $100,000,000. As a result of this, several things happened.

1.—The use of copper and other non-ferrous and non-rusting materials increased.

2.—A movement toward the development of rustless and stainless steel was started.

3.—The attention of all users of steel and steel products was turned to the question of rust-proofing methods and of better painting practice.

In most cases better painting practice meant more thorough cleaning before painting, and greater care in creating a bond between the paint and the metal. A quotation from Government specifications of some years ago will serve to illustrate the character of a good rust-proofing process. "The steel shall be processed after fabrication by some commercial method of rust-proofing which will coat equally all surfaces, so that samples of the fabricated sections shall show no rust

The Agar-Agar Test.

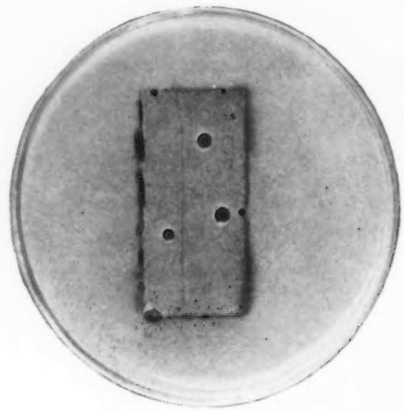


Fig. 6A (Above)
Untreated sample.

Fig. 6B (Below)
Rust-proofed sample.

after 72 hr. continuous exposure at room temperature to the spray of 20 per cent salt solution. When painted and subsequently scratched to the bare metal, there shall be no creeping of rust under the paint away from the scratch at the end of the salt spray test."

Three Methods

Three commercial methods of rust-proofing came into early prominence. These were galvanizing, sherardizing, and Parkerizing. When Leonard F. Hirsch, Philadelphia Rust-Proof Co., was asked what was the best process of rust-proofing steel, he said: "There can be no simple answer to this question, because different articles and different uses call for different processes. Take, for instance, cleaning. For some products, alkali cleaning is the cheapest. For others, acid pickling may be necessary. And in still other cases, the sand blast may be the most efficient method."

In the case of some products, cleaning and rust-proofing must be done after assembling. This is the experience with a steel casement window for which specific item Mr. Hirsch enumerates the following advantages and disadvantages of some rust-proofing processes:

Galvanizing—warps; hard to paint.
Sherardizing—difficult to do after assembling.
Zinc plating—not uniform on irregular surfaces.
Cadmium plating—good, but paint does not adhere well.
Parkerizing—good; paint holds well.

The Parker Rust-Proof Co., Detroit, which has long been prominent in the field of rust prevention, has developed three processes for surface treatment which it may be well to mention briefly. Parkerizing is a process of rust-proofing by immersing steel in a nearly boiling chemical solution which changes the surface to an insoluble phosphate which, under ordinary conditions, is said to be impervious to rust. This conversion is effected without any material change in dimension of the treated metal, and so lends itself readily to the rust-proofing of small products such as machine screws, bolts, and nuts. It has the disadvantage of requiring considerable time, and of therefore being relatively expensive for some applications.

Bonderizing is also a method of changing the surface characteristics by immersing in a chemical solution. It is much quicker than Parkerizing, and is used often as a preparation for painting or enameling. Another process is known as Parcolite, intended primarily for use on automobile bodies. Parcolite is applied with a spray gun at room temperature, and is said to produce a phosphate rust-proofed surface which is an effective base for paint or enamel.

Some of the advantages claimed for Parkerizing are that it does not impair the elasticity of fine springs, does not alter the magnetic properties of iron and steel, and that frequently it makes possible the substitution of these metals for brass or copper. The characteristic finish of a Parkerized product is matte black, and while this, as stated, is in itself rust-proof under

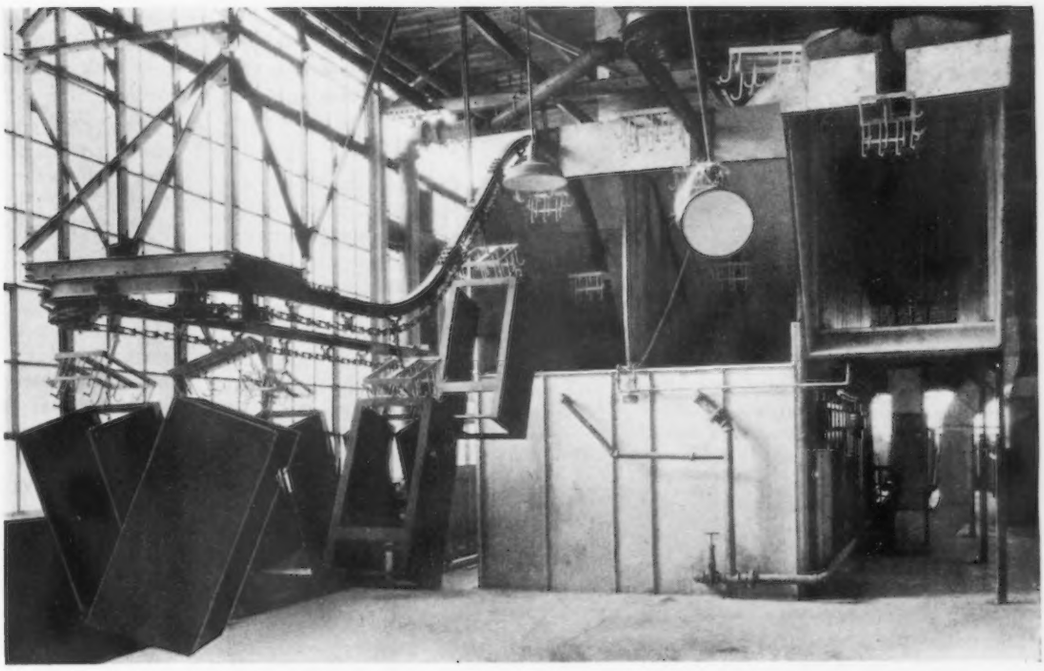


Fig. 7 — Refrigerator cabinets are bonderized before enameling. This shows part of a continuous process at the plant of Servel, Inc., Evansville, Ind.

many circumstances, it frequently is used as a base for paint or enamel.

After all that has been said about rust under paint, it perhaps is only fair to quote from a letter from Inland Products Co. "We are using with satisfaction, directly over rusty surfaces, an elastic metal coating which penetrates through the pores of rust, neutralizing the rust stimulants and putting the entire surface in a passive condition."

Among the methods used for preparing metal surfaces for paint should be mentioned metal spraying, which process will be described more fully in a later article. One of several companies working in this particular field is Mellowes & Co., Ltd., London, which has developed a method of depositing a thin coating of one metal on the surface of another by means of a metal spraying gun which essentially consists of a torch for melting the metal to be sprayed and of a jet of compressed air which blows the molten metal on to the surface which is to be covered.

Zinc and cadmium are sometimes spoken of as the greasy metals, and normally form a pure base for paint. However, the Mellowes company claims that when a zinc cadmium coating is applied by the spray gun to steel, it not only protects against corrosion but forms a porous surface which is a good base for paint or enamel. A. B. Hoefer, chemical engineer, Udylite Process Co., Inc., Detroit, in speaking on the subject of painting of cadmium, admits that in the past, lacquers and enamels have not adhered well to cadmium surfaces, but he states: "Recently this difficulty has been overcome by the development of special coating materials which adhere well and will stand severe bending without cracking or peeling. In addition to this, a treatment for cad-

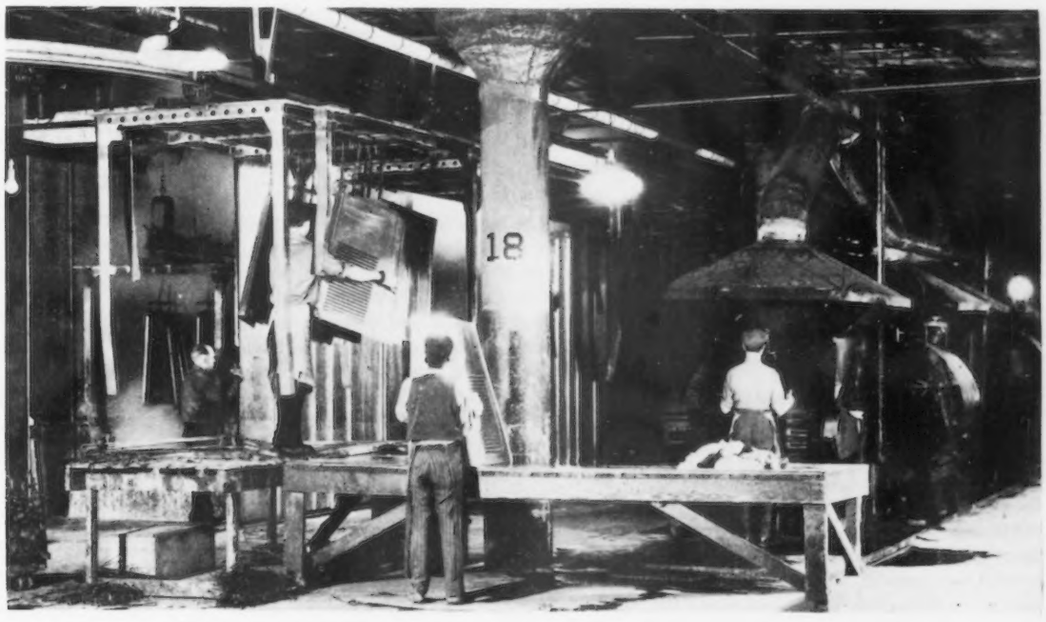


Fig. 8—The cleaning and rust-proofing department at the Hupmobile plant is here shown.

mium surfaces has been developed which creates a good base for ordinary paints."

One method of rust-proofing is merely to etch or roughen the metal surface by some means and then apply certain penetrating oils. In this case it is the oil and not the roughening action which constitutes the rust-proofing agent.

Cleaning Non-Ferrous Metals

One of the chief causes of failure of paint on any metal is dirt or impurities between the metal and the paint coating. Previous articles in this series have dealt extensively with cleaning and descaling, but certain cleaning processes on copper and brass and other non-ferrous metals, intended especially to prepare such metals for receiving paint, come logically under the heading of preparing metals for paint. The American Chemical Paint Co., North Ambler, Pa., in a study of this question of cleaning non-ferrous metals, gives under causes of paint failure, oil, graphite, grease, alkalis, and the miscellaneous materials commercially classified as dirt.

All of these must be removed from copper and brass and stainless steel if a smooth unbroken finish in the subsequent coating of paint is to be obtained. Oil is one of the commonest materials found on sheet metal as it forms part of the process at the mill and is frequently left on for its preservative property. In the past, a thin coating of oil was not regarded seriously by metal painters, but now with the quick drying undercoats that are looked upon with increasing favor, thorough removal of oil is of increased importance.

Petroleum fractions and various solvents are frequently used for removing oils and lubricants. Others use alkaline baths, but here the danger lies in a residual coating of alkali on the surface. The presence of even a trace of alkali is highly objectionable on surfaces which are to be enameled. The usual run of dirt is frequently removed successfully by washing with warm soap solutions under pressure, but as all classes of impurities exist at one time, it is an advantage to have a single cleaner designed to remove all. A cleaner of non-ferrous metals, therefore, should be one which will remove oil and grease, which will not leave an alkali residue, and which will produce a surface to which a prime coat will adhere tightly. Several such universal cleaners have been developed by different companies. The American Chemical Paint Co. developed a solution known as Deoxidine. For large parts this solution is applied by so-called dopers with large brushes. Parts to be cleaned rest on a deck or floor provided with a V groove underneath for collecting the draining liquid. In some cases the deck is movable and the parts are cleaned in a continuous process. While the solution is still wet, the surfaces are hand-scrubbed with steel wool, after which the parts are washed with a hose, first with cold water and then with hot water.

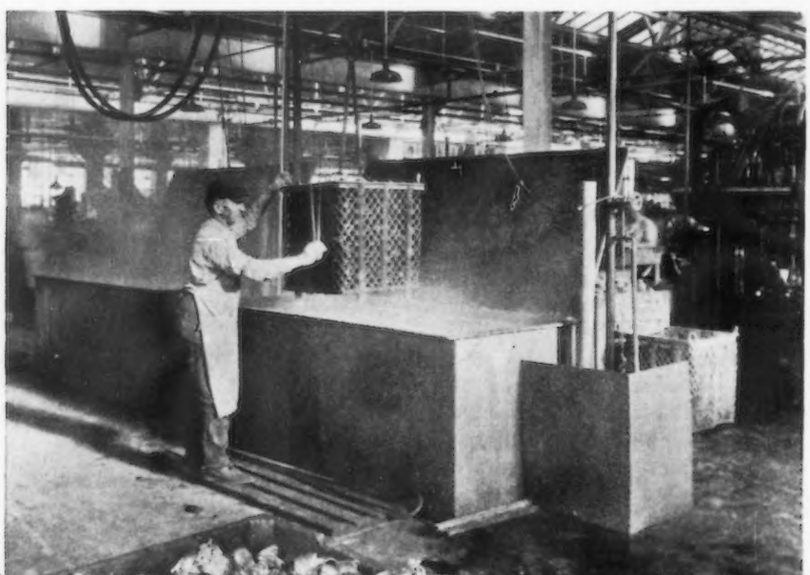


Fig. 9—Carburetors and other similar parts are frequently rust-proofed by immersion in still tanks. This shows a load of carburetors about to enter a process tank for Parkerizing.

Preliminary drying is with an air hose, and this is followed by oven drying, ordinarily at a temperature of 150 deg. F. Frequently parts, particularly aluminum parts, are wiped with a rag dipped in alcohol after they come out of the drying oven. This operation is partly for the purpose of inspection to insure that a thorough cleaning job has been done. When assembled automobile bodies are cleaned by the above method, the unit cost averages about 60c. Small parts on a production basis follow a similar sequence except that immersion tanks replace the brush application. Cadmium and zinc, whether applied by the electrolytic or the fused powder method, as stated, may offer difficulties to the painter for the reason that these methods have an alkaline reaction with most paint oils, tending to slowly change the oils into soap and thus destroy the adhesion of the paint coat. The well-known flaking of paint from zinc and cadmium results from this cause. To prepare these metals for painting, therefore, requires some radical change in their surface characteristics. One of the best methods is to create a thin phosphate film by chemical treatment. This corrects the alkalinity and leaves the surface in a slightly acid condition which is satisfactory for painting. Among the different processes available is Granodizing. Parts free from oil are immersed in a heated solution for from one to two minutes. A variation of the process, known as Electro-Granodizing, coats clean metal surfaces with a thin film which forms an excellent foundation for paint and which at the same time is said to be corrosion proof.

New Aluminum Finish Resists Ocean Spray

Light reflectors made of Alzak aluminum, a product of the General Electric Co., are said to have unusual weather-resisting properties and high reflectivity. This new material is produced by an electrolytic brightening process, costs but slightly more than an equivalent porcelain finish, has a reflection factor of more than 80 per cent, is rust-proof, and is very hard and durable. Tests made in actual ocean spray show the material as impervious to salt atmospheres. The material has a low depreciation factor, and the original reflecting efficiency can be restored after installation by washing with soap and water.

Large Observatory Dome Calls For Intricate Steel Work

A FABRICATED steel rotating dome, semi-spherical in shape, 62 ft. in diameter and 45 ft. high, weighing 125 tons and requiring intricate steel work, much of it bent to curved form and held to close limits, is being built on the top of Mount Locke near Fort Davis in southwestern Texas. It will house an 80-in. reflecting telescope 26 ft. long, the second largest ever built, which is being constructed by the Warner & Swasey Co., Cleveland, for the University of Texas. The dome and telescope will be mounted on the top of the three-story structural steel observatory, making a total height of 71 ft. above the mountain peak. The dome, in its design and construction and mechanical equipment, has various refinements and improvements when compared with domes previously constructed for astronomical purposes.

The massive dome will be rotated and auxiliary moving parts will be driven electrically; all moving mechanisms will have push button control within reach of the observer. There are four movements of the dome mechanism in addition to the various adjustments of the telescope. The dome, designed by the Warner & Swasey Co., has been constructed by the Patterson-Leitch Co., Cleveland.

The main structural members of the dome are two main trusses and a base ring. The structure is mounted on a plate and girder base which is fastened to the top of the columns of the observatory building. The two main trusses are 4 ft. 6 in. deep with ⅜-in. web plates, 8 x 6 x ½-in. bottom chord angles and 6 x 6 x ⅜-in. top chord angles. Auxiliary ribs shaped to form the semi-spherical contour of the dome are fastened to the main trusses and base ring, completing the network of steel that forms the frame. These auxiliary trusses are built alternately of 36-in. channels and spliced beams. Sheathing angles are attached to the auxiliary ribs.

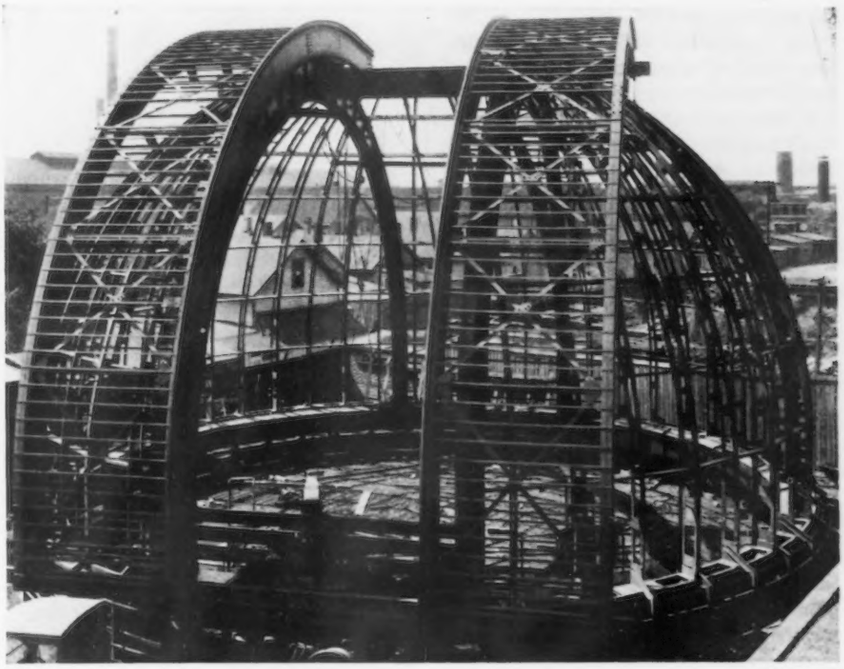
The bottom ring is fabricated from two 10-in. channels that are rolled with the flanges facing each other and reinforced by a 6-in. beam on the outside of the channel.

To provide clear opening for observation a space 18 ft. wide between the main ribs is not filled in with structural members on one side from the base to a point a little past the peak of the dome. This open section, which provides a clear vision space 16 ft. wide between the main trusses, is covered by two movable shutters that extend 9 ft. past the peak of the dome.

As extreme accuracy was required in forming the members to assure correct fit on all curved sections, wooden templates were made of all curved pieces from full-size drawings and from these templets steel members in exact duplicate form were made. All curved members were bent cold on a standard bending machine. For laying out the work a drawing board of unusual size, being 65 ft. x 45 ft. in dimensions, was erected in the shop. Fabrication was done with such accuracy that no trouble was experienced in fitting the parts together.

bridge, electrically operated through a cable, runs from the base to the top of the dome, furnishing access to any point in the dome and all parts of the telescope. A stairway built as an integral part of the dome gives access to the bridge from the observer's floor. This bridge in its up and down movement follows the curvature of the main trusses, wheels on the back of the bridge rolling against the truss flange. Extending from the bridge are swinging pulpits for reaching points beyond the reach of the bridge proper. As the bridge is self-leveling, its floor is always in a level position.

There are also two elevating platforms, semi-circular in form, located on either side of the pier on which the telescope is mounted. These platforms, hydraulically operated, can be raised 15 ft. above the observing floor,



Sixty-two foot dome for McDonald Observatory, University of Texas. Designed by the Warner & Swasey Co., fabricated by the Patterson-Leitch Co., Cleveland, Ohio.

The dome revolves on 26 30-in. cast steel, roller bearing equipped wheels that run on rails mounted beneath the base ring. The dome will be covered on the outside with 18-gage and inside with 22-gage galvanized sheets.

There is one motor for revolving the table and another for moving the shutters, which slide backward and forward along the outer side of the dome the distance required to cover and uncover the open space in the dome through which the telescope is trained. The drive is through cables and the motors are controlled from the observer's floor. The motors are equipped with built-in speed reducers.

A rectangular-shaped observing

bringing the observer to the height at which he wishes to work while making observations. The mechanism for operating the moving parts is all located within the structure just below the base of the dome.

The dome, with the exception of the covering, has been completely erected in the yard of the Patterson-Leitch plant in order to make sure that all members fit and that moving parts function properly. While many minor joints were made by welding, all the larger members were joined by bolts which will be replaced by rivets when the dome is reerected in the field. The covering of sheet steel will be placed on the dome after it is reassembled in the field.

Ingot Mold Inserts

Tapered Plates and

▲ ▲ ▲

PROGRESSIVE industries have not been bunkered by the depression. The tool steel and special steel industry, particularly, has not relaxed its efforts to develop improved products. In that industry, the depression era has spurred research, with the result that some notable achievements have recently been scored. The so-called compound and ply or veneer steels are noteworthy examples among these developments. A pioneer in this work has been the Jessop Steel Co., Washington, Pa., manufacturer of a complete line of tool and special alloy steels in rolled or hammered bars, as well as in plates, sheets and cold-rolled strip.

It is typical of most of these steels that the articles made of them in many cases need not be homogeneous throughout their entire mass and that often it may even be an advantage if they are not homogeneous. Many tools require a hard and wear-resisting working edge, while the principal requirement for the body is toughness. In other cases, such as that of the stainless or rustless irons, it is usually only the surface of the finished article that requires these special properties, while the composition of the underlying metal is immaterial so long as it conforms in its general physical properties with the requirements of the case.

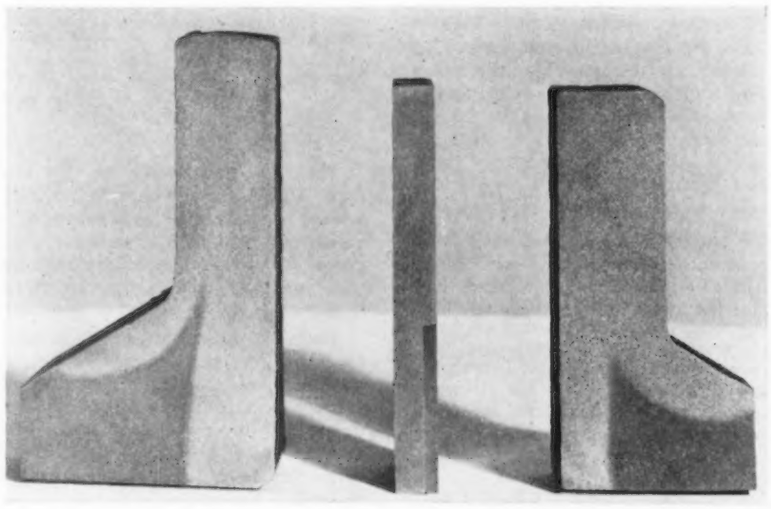
As the cost of the special steels and alloys is, in most cases, much higher than the cost of ordinary steel, which might constitute by far the greater part of the finished article, and as, moreover, the latter is in many cases more suitable than the former because of its greater toughness and machineability, attempts to combine the two materials have been made for a long time. But these efforts have generally not been very successful because the conditions under which a permanent bond could be established between metals of so widely differing properties were not clearly understood.

In fact, the belief for many years was that such highly alloyed steel as high-speed steel, stainless and the like, could not be pressure-welded at all, and the patent literature on the subject is full of inoperative processes, most of which are based upon the idea that it is necessary to bond the components by incipient fusion.

At the Jessop company's plant in 1928 successful attempts in this field were made, and the conditions under which a permanent bond between highly alloyed chrome and chrome-tungsten steels and ordinary steels could be established by means of a very simple process were recognized. Conditions arose, however, which caused an interruption in this work, and it was only when the business depression of recent years forced all research work into channels of greater economy and efficiency that this matter was energetically taken up again.

During this period, a number of new processes have been developed commercially, some for the manufacture of the so-called ply or veneer steels, consisting of a body of ordinary low-carbon steel with a surfacing on one or both sides of a nobler metal or alloy, such as nickel, stainless steel, monel metal, etc.; others for the manufacture of compound steels having a working edge of tool steel and a body of tough low-carbon or lightly alloyed steel.

A common characteristic of all these processes as developed by Jessop is that they are based upon the formation of a composite ingot, in which the cheaper metal is cast around specially prepared, formed



A few sections of composite bars, etched so as to show the tool steel inserts (dark). Radiator trim and headlamp covers (at right) made of composite stainless steel

Used to Produce Composite Steels

By M. R. TREMBOUR
Director of Research, Jessop Steel Co.

and positioned inserts of the nobler metal, so that the latter is completely enveloped within the former in the ingot and is only exposed at the surface after the constituents of the ingot have been united in a permanent bond by hot rolling. This principle has been found to be far simpler, cheaper and more satisfactory than previous attempts and more or less unsatisfactory and expensive methods of welding the components by surface fusion or by welding, brazing or otherwise bonding the two metals in a finished or semi-finished state.

Weldable and Unweldable Planes Formed

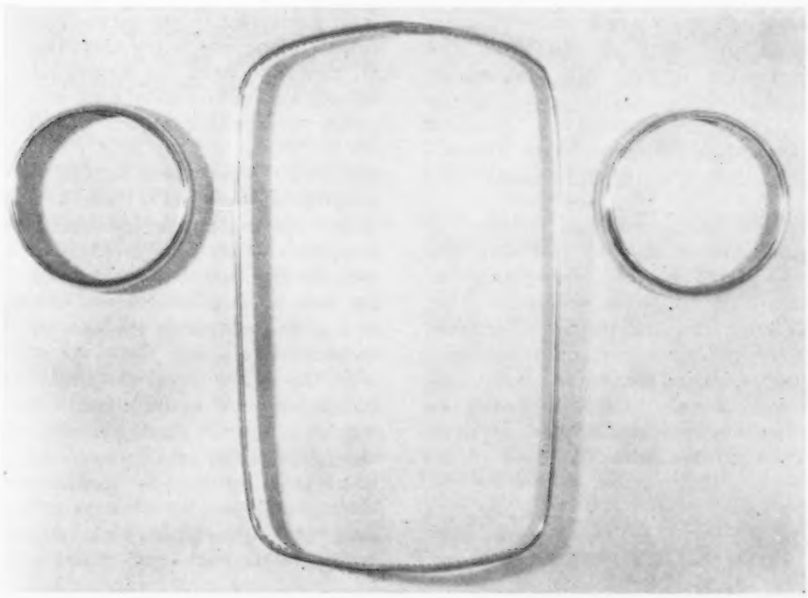
The manufacture of the veneer steels is furthermore based upon the formation of at least one weldable and one unweldable plane within the ingot, the same principle being employed in another new and interesting development, which will be discussed later. These planes extend nearly from side to side and from bottom to top of the ingot, without, however, being exposed at its surface, so that the latter looks exactly like the surface of an ordinary parallel-sided ingot. In addition to the unweldable plane or planes the ingot contains one or more parallel weldable planes, so that, when such an ingot is hot rolled, the laminations adjoining the latter are permanently bonded together, while those adjoining the former are not.

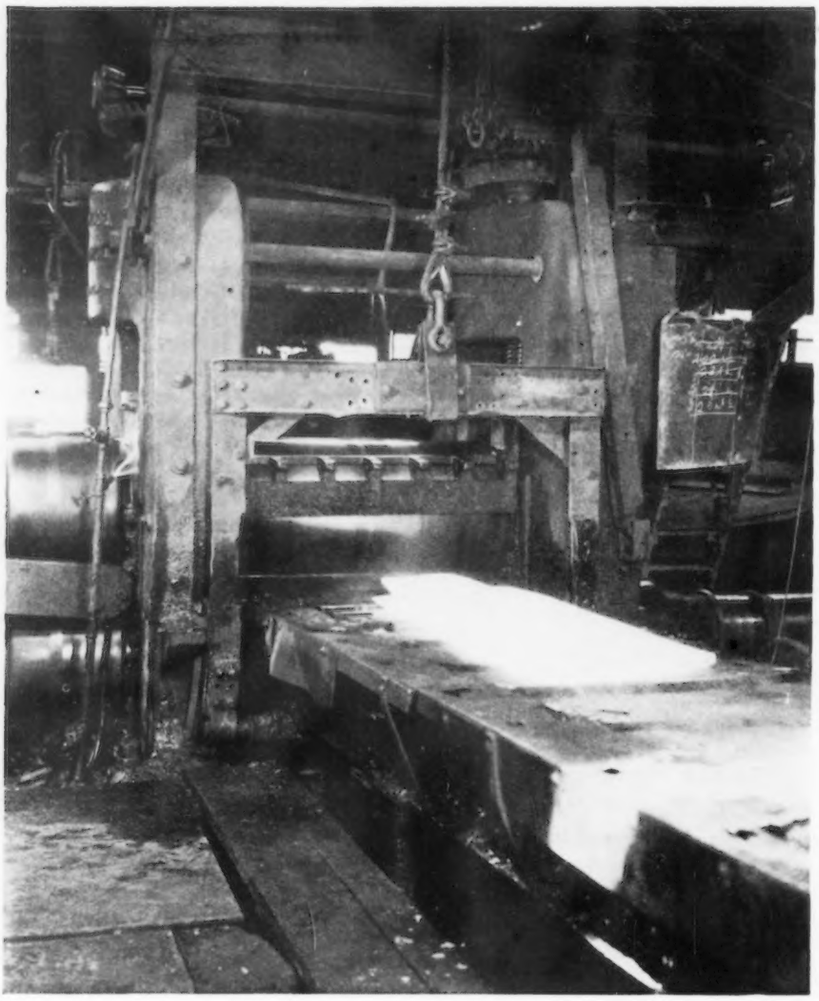
In order to establish these planes within the ingot several methods have been developed. A single plate of the veneer metal, considerably smaller in thickness and slightly smaller in width and length than the ingot to be made, may be thoroughly cleaned on one side and the other side smoothed and coated with a suitable weld-preventing material. Or two such plates may be fastened together with their coated sides in contact. Or in some cases the weld-preventing material may be applied to both sides of a plate of any suitable metal interposed between the two plates of veneer metal. Also in some cases the outer clean surfaces of the latter may be covered by plates of low-carbon steel cleaned and prepared for welding on both sides.

The inserts thus prepared may consequently consist of from one to five plates, which are all securely fastened together so that the cast steel cannot enter between them. Usually only one such insert is used per ingot, but at least two are necessary for the manufacture of plates and sheets veneered on both sides. They are then placed into a mold large enough so that the insert does not touch its sides or bottom and molten low-carbon steel is cast about them. The resulting ingot is rolled into plates or sheets of approximately twice the thickness desired for the finished hot-rolled product, which, after trimming off the marginal edges of solid soft steel, are separated along the weld-preventing plane.

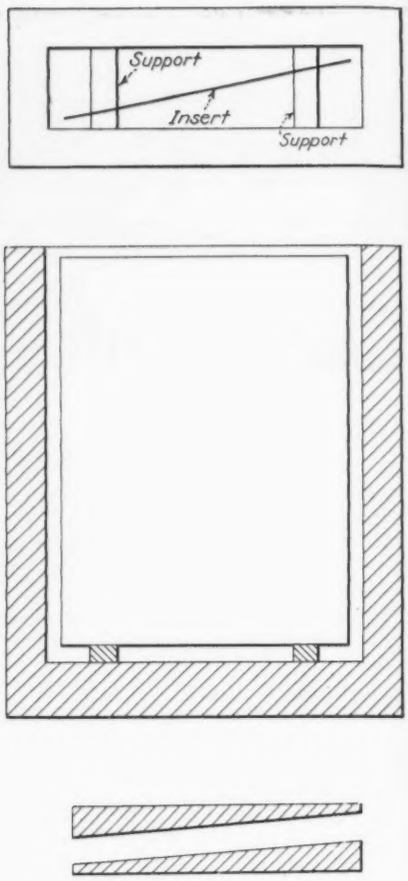
They may then, if desired, be further hot or cold rolled. No special so-called welding heats are required during the hot rolling process, which is carried out at the temperatures ordinarily employed for the rolling of the insert material. At these temperatures a perfect bond is established between the components of the ingot except along the plane or planes of the weld-preventing material.

It is not possible by this method to directly roll stainless clad sheets with a polished surface, because even though the stainless insert plates be





Cogging ingots of composite high-speed steel into plates.



Insert supported in ingot mold, shown in plan view at top, provides a parting plane for the division of the steel into two tapered sections after it is rolled into plate. Cross-sectional view of ingot mold with insert (middle illustration). A pair of tapered plates produced by the new process (at bottom).

provided with a perfect polish, this effect is lost through recrystallization during casting, reheating and rolling, as well as through the effect of the interposed weld-preventing material. However, since the stainless surfaces are completely inclosed during the entire operation, they are not exposed to all the hazards connected with heating and rolling unexposed and are usually as good in the end as they were before the processing started.

Tapered Plates Produced

Another very interesting process developed by the Jessop Steel Co. is based upon the same principle as the above, namely, the formation of an unweldable plane within an ingot. It concerns the rolling of tapered, beveled or curved plates. There has been no known method heretofore to produce such shapes by ordinary rolling methods.

This new method consists in forming within an ingot an unweldable plane inclined with regard to two opposite sides of the ingot, rolling the ingot into an ordinary plate, trimming off the margin of solid steel along the edges of the plate and separating it into two bevelled or tapered plates.

Composite Bars for Shear Blades, Dies, Etc., Manufactured

The weld-preventing plane is usually established by fastening two steel plates together face to face but separated by some weld-preventing material, cleaning the outer surfaces of this two-plate insert so as to render them weldable, placing the insert into a mold at a suitable inclination to two of its sides and without being in direct contact with the mold chamber, and then casting molten steel of the same or a different composition (as the insert plates) around them.

Plates of any desired taper or bevel, from side to side, or end to end, may be made by this simple method with ordinary plate mill equipment.

Of particular interest among other new developments is the manufacture of composite bars for shear blades, knives, automobile body dies, etc., in which the working edge is tool steel, the body ordinary or lightly alloyed steel. While composite tools of these kinds have been made before, they were made as a rule by combining the two types of steel in the finished or semi-finished article, by welding in the case of carbon steel and brazing or similar methods in the case of alloyed steels.

At the Jessop Steel Co. these materials are now made directly from composite ingots, and perhaps the most interesting development along this line is a method for making saw blades and other flat sections with a high-speed steel or high carbon-high chrome steel edge and ordinary or lightly alloyed steel body.

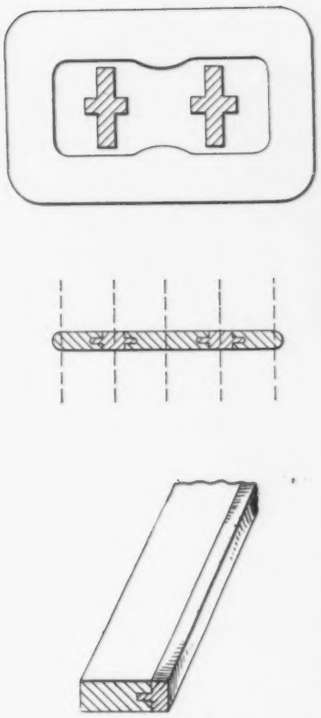
For this purpose the high-speed or other tool steel is first rolled into bars of a flat section, such as 2 x ½ in. and having preferably a rib or projection extending along the centers of the wider sides. These bars are annealed, cut to lengths and fastened together in multiples by cross strips, parallel to each other and at the proper distance, the wider sides facing each other. These insert units are then carefully cleaned by pickling or sand-blasting. They may be coated, as for instance, by dipping into a copper solution, but it has been found that there is little, if any, advantage in this.

The clean inserts are then inserted into slab molds of a very flat section, such as a 6 x 2¼ in. or 12 x 3 in., in such a way that the narrow (½ in.) sides of the inserts are very close to, but not in actual contact with, the wide sides of the mold chamber. Ordinary soft or medium-hard unalloyed or lightly alloyed steel is then cast into the molds so as to completely envelop the inserts.

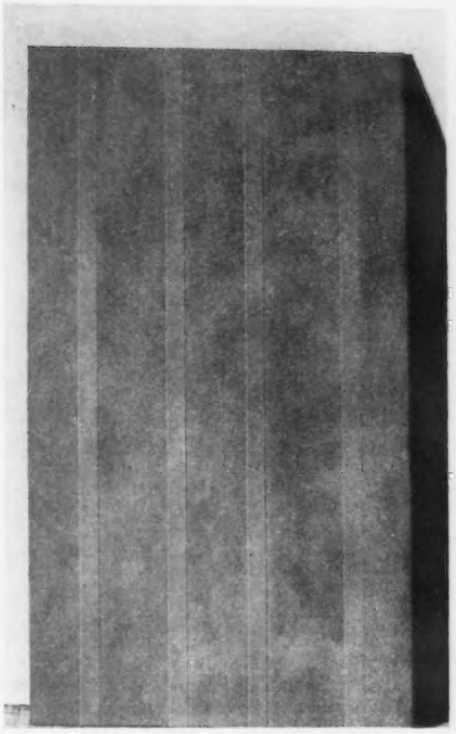
The ingots thus formed may be rolled directly and without edging into a plate or band of approximately the same width of the ingot or they may be edged so as to reduce the width.

In the resulting plate or band a complete permanent bond has been established between the components. The originally very thin layer of tough steel covering the originally narrower sides (edges) of the inserts has been reduced to a few thousandths of an inch or may have been completely removed by scaling. In this plate or band the laminations of hard and tough steel alternate side by side across the width of the workpiece, while in the first described method of making ply or veneer steels they lie one above the other alternating in the direction of the thickness of the piece.

The hot-rolled plates or bands of composite hard and tough steel are annealed and ground if necessary. The components are now permanently bonded together. They may now, if desired, be further rolled, hot or cold, to very thin sections, such as required for hack or band saws. Finally the plates or bands are divided into a plurality of flat bars or strips by a number of parallel cuts running alternately through the soft and hard components. These bars or strips have a body portion of softer and tougher steel, which facilitates the fabrication of tools made therefrom and practically eliminates loss through breakage in service, and have a longitudinal working edge of high-speed or other suitable hard steel in every respect as good as that of a tool made entirely of such material. They are suitable for a great variety of cutting and slotting tools, especially for metal cutting saws of all kinds.



Plan view of ingot mold with two tool steel inserts (at top).
Completed band with division in strips indicated by dotted lines (middle illustration).
Band in final form with tool steel on one edge (at bottom).



Portion of the finished composite band, pickled clean to show the alternate layers of high-speed steel (lighter) and of ordinary steel (darker). These bands are usually cut into eight strips, each strip consisting of a major portion of ordinary steel and a minor edge portion of high-speed steel.

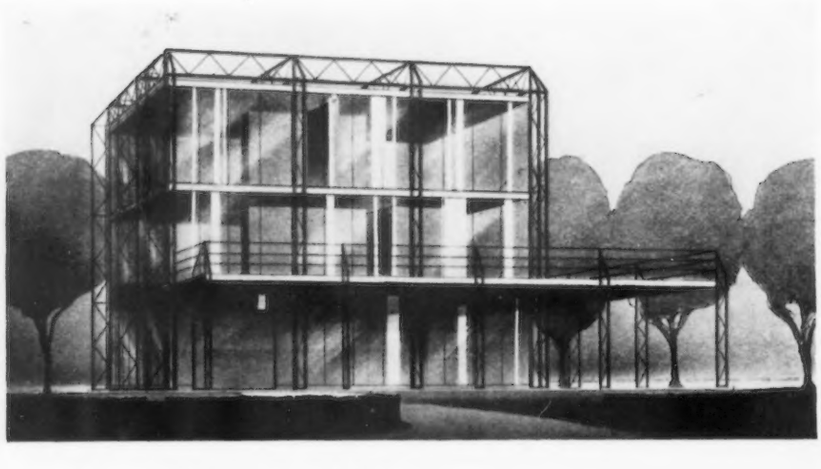
Added Phosphorus In Low-Carbon Steel

THE effect of added phosphorus on low-carbon steel was discussed in a report presented to the meeting of the American Society for Testing Materials at Atlantic City, N. J., June 27, by the so-called joint committee on investigation of the effect of phosphorus and sulphur in steel, H. S. Rawdon, Bureau of Standards, acting chairman.

Four heats of steel, each approximately 95 tons, were made at the Lorain Works of the National Tube Co. in the presence of an inspection committee of the joint committee. To three of the heats, ferro-phosphorus was added in the ladle, to give a progressively increasing phosphorus content. To the heat of lowest phosphorus content (0.007 per cent), no additions were made, the phosphorus content being entirely residual. The amounts in the other heats were 0.051, 0.060 and 0.080 per cent.

The results of the tests showed an increase in tensile strength and percentage of elongation with increasing phosphorus content, whereas in the case of the proportional limit and reduction of area a characteristic relationship was not established. The shearing strength was affected, by increased phosphorus content, similarly to the tensile strength. Within the limits of phosphorus content used, an increase in phosphorus did not adversely affect the behavior of the steels under cold bending in the as-received or annealed conditions, but did have an adverse effect in the quenched condition.

The effect of some extraneous factor of far greater importance than the phosphorus content was shown by the results of the impact tests. "This factor is in some way associated with some apparent 'abnormality' of one of the steels as shown by the microstructure. This factor, however, has not affected the tensile properties determined to any significant degree, nor has the behavior of the steels under cold bending or shearing been noticeably affected."



Architect's sketch of steel and glass house by Modern Houses, Inc., Chicago. Steel work during course of erection.

Steel and Glass House To Be Exhibited

A "CRYSTAL HOUSE," a steel and glass dwelling, will be exhibited this year at A Century of Progress, Chicago. It will be built entirely above ground and will be three stories in height, the first floor housing the entrance, a hobby room, heating plant and a garage. General living quarters are on the second floor and sleeping rooms and baths are on the third floor. The architect is George Keck, Chicago.

Two objects of this construction are to cut cost and to hold to a minimum the time of erection. The structural steel, except for floor panels, consists of a frame of slender trusses which are left exposed. The trusses carry steel beams, all loads being transmitted to the trusses. In many portions inside the house the framework is left exposed, this being notably so in the central portion around the stairs. The floors are of heavy sheet steel.

Baseboards are metal as is all other trim, including door jambs, the glass wall frames, etc. The doors are metal covered and the stairs are steel. Metal heating ducts are exposed and are used for functional decoration. The foundation of the house is concrete, this being the only "damp" construction, all other construction being dry. Synthetic wallboard takes the place of plaster. There are no bearing walls or partitions in the house. All exterior walls are of glass set in frames and secured similar to store-front construction. All glass is permanently fixed, an air-conditioning system providing for necessary ventilation.

The steel work is fabricated and erected in sections in the shop, where it is also painted. The sections are bolted together in the field. Floor sections are treated in the same manner. Erection time is estimated as follows: the foundations, water sewer and gas, and reinforced concrete ground floor—one week. The inclosure—steel, glass and roof—one week. The interior — plumbing, heating, carpentry and electricity—one week. It is expected that a house of this type can be ready for occupancy three weeks after the out-of-doors work is started.

Largest All-Welded Steel Barges Ever Made on Pacific Coast

THE construction of four steel barges on the Pacific Coast has attracted widespread attention in that district among ship and boat builders. The reason is that they are the largest all-welded floating equipment built in that part of the country. Each barge is 134 ft. overall length, 36 ft. overall width, with a depth of 7 ft. 6 in. The draft when loaded to capacity is 6 ft. and the carrying capacity is 650 net tons. Each barge weighs approximately 110 tons.

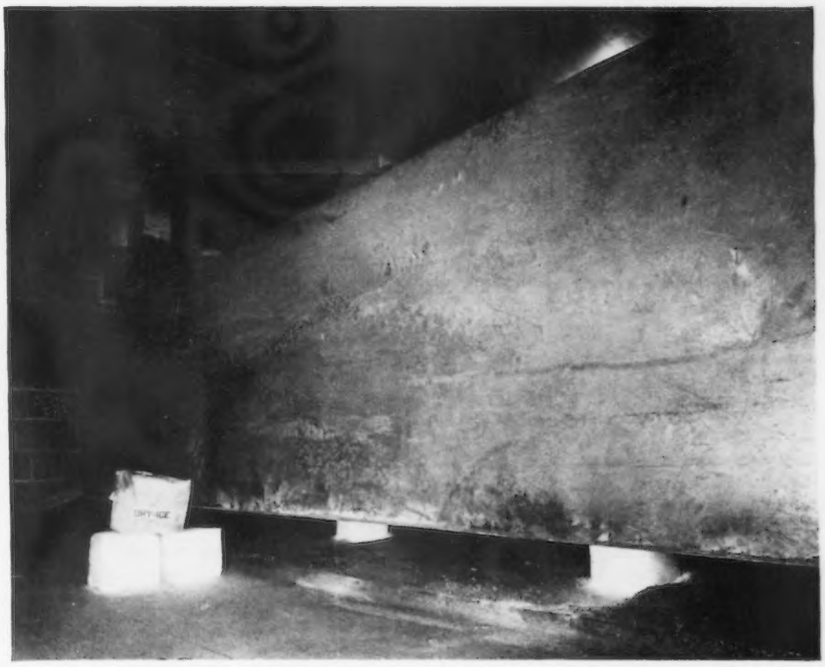
Steel for these units was supplied by the Pacific Coast Steel Corpn. and consisted of about 300 tons of sheared plates, 100 tons of bars and bar-sized angles, 15 tons of universal mill plates and 55 tons of standard structural shapes. The barges were built by the Commercial Iron Works of Portland, Ore., for the Western Transportation Co., a subsidiary of the Crown Willamette Paper Co. They are to be used on the Columbia and Willamette rivers for transporting hog fuel and paper chips between the paper company's various plants.

"Dry-Ice" Useful for Spotting Tanks and Machinery

AN interesting new method for placing heavy machinery or equipment has been used with success by the engineer of a large ice cream plant in New York City.

The problem involved was the spotting of a rectangular welded steel brine tank approximately 20 ft. x 13 ft. x 5 ft., weighing 6500 lb., on a flat foundation. The tank was fabricated on wooden cribbing placed so that all parts of the tank were accessible for welding.

Six blocks of "Dry-ice" (solid carbon dioxide), each 10 in. x 10 in. x 10 in., were next evenly spaced on the foundation. The tank was moved approximately into place and lowered by jacks until it rested directly on the "Dry-ice." At this stage the friction between the tank bottom and the "Dry-ice" was so slight that the entire tank could be moved into exact position by one man pushing against it. It was then blocked to prevent any lateral shifting, and allowed to settle to its final position as the "Dry-ice" melted away. As "Dry-ice" evaporates to harmless gas, no trace of it remains under the tank.



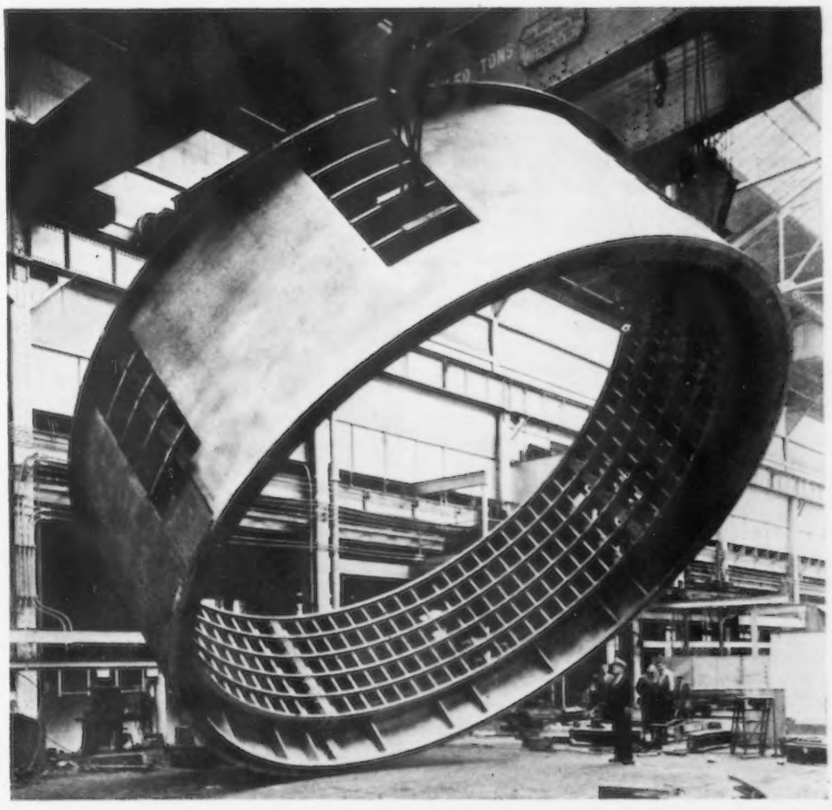
The time required in this instance for complete melting of the "Dry-ice" was about 5 hr., but this can be accelerated or retarded by heating or insulating the blocks as the structure settles. "Dry-ice" will sustain far heavier loads than in this case (approximately 11 lb. per sq. in. of supporting surface), but six standard blocks were selected as a minimum number to assure uniform settling regardless of any variation which might be found in a single block.

The method is believed to be applicable to lowering all kinds of heavy equipment where space is cramped and where overhead crane facilities cannot be had.

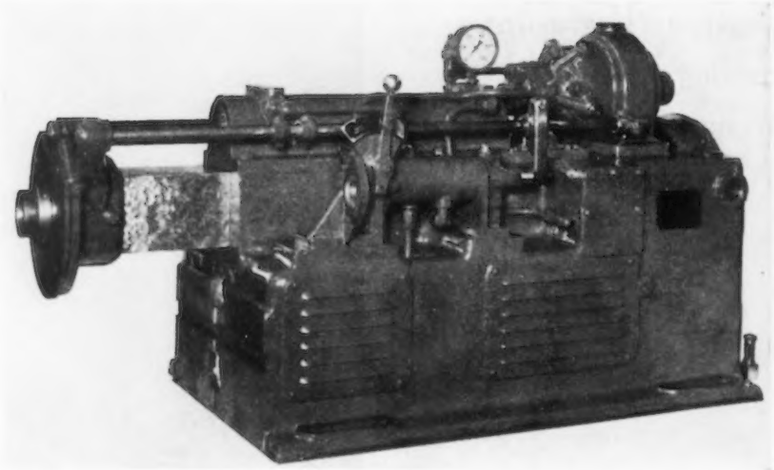
Born in Schenectady

WHEN the waters impounded behind Boulder Dam are finally turned through the Boulder power station, the world's largest hydroelectric generators to date, born in the General Electric shops at Schenectady, will convert the mighty power of the Colorado River into electricity for transmission to Los Angeles, 265 miles away across desert and mountain.

The photograph shows just the stator frame for the first of these huge machines, rated at 82,500 kv-a. The complete generator will be 40 ft. in diameter, 32 ft. high (above the floor) and will weigh over 2,000,000 lb. Dissembled into sections small enough to be shipped by rail, at least 40 freight cars will be necessary for the transportation of each generator to Boulder Dam.



Self-Contained Hydraulic Drill Unit Has Square-Type Ram



USE of a large square ram that cannot twist or turn is a distinctive feature of a new self-contained hydraulically-actuated drill unit offered by the W. F. & John Barnes Co., Rockford, Ill., for drilling, reaming, boring, milling and other operations. The ram is accurately machined to assure a close fit throughout its bearing, and is proportioned to provide ample support for the spindle and multiple spindle head even to the extreme outer position. Its maximum stroke is 12 in.

The hydraulic feed cycle provides rapid approach of the tools to the work; feed at predetermined rate; accurately-controlled dwell, if required; rapid return of tools to the starting position; and automatic stop or repeat. Easily adjusted dogs operate the control valve to provide the rapid approach and other feed cycle motions. Single lever control of the operating cycle facilitates setting-up.

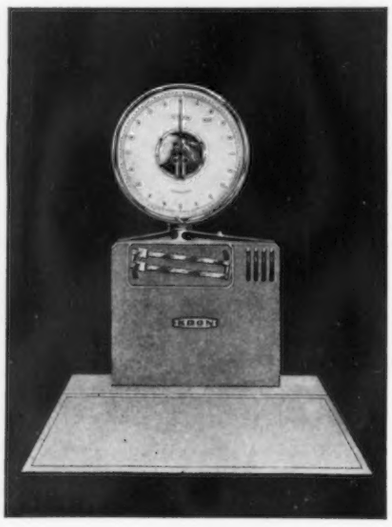
The Barnes hydraulic feed system includes an adjustable volume pump which supplies oil at high pressures for feeding the tool; a constant-volume pump which supplies oil in large quantity for rapid traverse; a control valve for instantly changing the movement of the cutting tools from feed rate to rapid traverse or the opposite; and a closed hydraulic circuit, including oil reservoir, from which air is entirely eliminated. The units are connected by a minimum of piping, without by-passes. It is stated that the arrangement maintains a constant ratio between the feed rate and the cutting tool speed under all operating conditions, and eliminates tool chatter, non-uniform slide action, and sticking valves. The life of the oil in the circuit is prolonged and its temperature remains close to that of the atmosphere even in extremely heavy service.

A 5-hp. or smaller motor, inclosed in a ventilated compartment in the base, drives the pumps and also the spindle. The latter is mounted in ball bearings in the square ram. Speed changes are obtained through pick-off gears; with a 1200-r.p.m. motor spindle speeds range from 92 to 750 r.p.m. and with an 1800-r.p.m. motor they range from 138 to 750 r.p.m. The spindle nose has a socket for driving single tools or multiple spindle heads bolted to the flange on the end of the ram. This flange is integral with the ram body.

The units are of rigid construction. All shafts are splined and all gears are of steel and hardened. Anti-friction bearings are employed throughout. The units can be operated in any position or at any angle. A number of them can be operated in combination, and with either individual or group control. The weight of the unit, with motor, is 1200 lb.

Unit-Weight Type Platform Scale

A NEW cabinet or unit-weight type dormant platform scale having from one to four unit weights, depending on the specifications, has been announced by the Kron Co., Bridgeport, Conn. The scale is arranged so that by pressing down on the first handle a unit weight equal to the capacity of the dial is added to the weighing system. By pressing down the second handle a second weight equal to the dial capacity is added and so on; or if one wants to add the whole four unit weights at one time this can be done by simply pressing down the fourth handle. The weight thus added is shown in a small window on the dial face.



The scale is used where larger loads are to be weighed by small increments and where it would be impractical to graduate the dial to the small graduations necessary. The company's standard free floating platform is used in this assembly, and the indicating mechanism is the improved one cam translation ball-bearing type.

Pressure Vessels of Nickel-Clad Steel Plate

BABCOCK & WILCOX CO. is fusion-welding pressure vessels, 72 in. in diameter, 23 ft. long, constructed of Lukens nickel-clad steel plate, 9/16 in. in thickness. Twenty per cent of the total plate thickness is 99 per cent pure nickel with a base of flange-quality steel. These vessels were designed for a working pressure of 100 lb. per sq. in. with stress carried only in the steel. All welds were X-rayed and the entire construction is in accordance with the A. S. M. E. code for class I welded vessels.

The automobile industry consumes a considerable portion of the total non-ferrous metal used in the United States each year. On an average each car contains 60 lb. of copper, 7 lb. of tin, 93 lb. of lead, and 18 lb. of spelter. The yearly consumption of metals is 12, 17, 22, and 7 per cent respectively as compared with the metal used in all industries.

Gas-Operated Lift Truck Features Ample Power and Convenient Control

UNUSUALLY rapid pick-up and ample power, under instant control, for operating emergencies such as climbing steep ramps, are claimed for the 3-ton gas-operated industrial lift truck recently brought out by the Elwell-Parker Electric Co., Cleveland. Rugged unit design, stability of travel, and quiet operation are also emphasized.

The machines are of simple design and construction. Controls, including choke, electric starting button, throttle and shift lever (two speeds forward and two reverse) are grouped within easy reach of the operator's right hand. Dials and indicators are immediately in front of him, and the horn button is on the end of his hand grip. The arrangement permits the operator to keep his hand continually on the steering wheel at his left. Steering is readily accomplished with one hand.

With the throttle control located beneath the "balancing grip" by which the operator steadies himself when traveling at high speed, control of the truck is literally put "under the operator's thumb." A single pedal controls both the brake and clutch. Pressing down on the pedal releases the brake and engages the clutch; releasing the pedal disengages the clutch and applies the brakes. Brakes are set the instant the operator steps off the platform or even lifts his foot. Further protection, of special advantage when a loaded truck is standing on grades, is provided by the transmission gear lock.

A hydraulic hoist mechanism, consisting of cylinder and valve, receives fluid under pressure from a pump driven directly by the motor. The cylinder through a balanced lift elevates the platform, mounted on rocking links. Extra clearance beneath the platform has been obtained by placing the hoisting cylinder high in the truck. This avoids catching or fouling as the truck passes over toeplates or rides over the top of a ramp. Parts for these gas trucks are interchangeable with those of company's electric and gas-electric units.

Size Factor in Material Tests

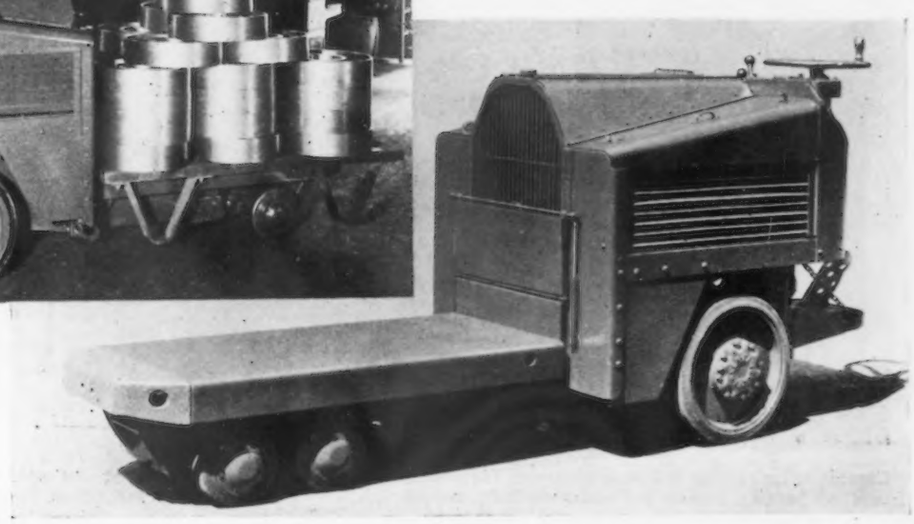
THE size and shape of the test specimen were found to have practically no effect on the observed tensile strength or on the observed Johnson's elastic limit in the case of studies of the properties of the structural grade of steel, according to Inge Lyse and C. C. Keyser, research associate professor of engineering materials and laboratory assistant in civil engineering respectively, at Lehigh University, Bethlehem, Pa. They contributed their findings to the American Society for Testing Materials at Atlantic City, N. J., June 27.

Tests of Structural Grade of Steel

Specimens were machined from ¼-in., ½-in. and 1-in. plates rolled from the same heat, and they varied in size from ¼-in. to 1-in. diameter bars to ¼ x ¼-in. to 1 x 4-in. rectangular sections. They found an increase in the elongation in 2 in. with increase in the size of the test specimen. The reduction of area decreased with increase in the width-thickness ratio in the rectangular sections but remained nearly constant for circular bars of different diameters.

The ratio between Johnson's limit and tensile strength was nearly constant for the different sizes and shapes of test specimens, but showed a marked difference for different thickness of plate as rolled. The thickness of the plate as rolled had a marked effect upon the Johnson limit but only slight effect upon the tensile strength. Only slight differences in results were obtained on specimens having the full thickness of the rolled plates and on specimens machined from the center portion of the plate.

In short, the summary of the paper states that the results of the investigation substantiate those of previous studies which have shown that the observed strength properties are little, if any, affected by the size and shape



CONTROLS are grouped within easy reach of the operator, and steering is readily accomplished with one hand. A single pedal controls both clutch and brake.

of the test specimen, while both elongation in 2 in. and reduction of area are affected appreciably.

A paper on the effect of thickness on the accuracy of Rockwell hardness tests on thin sheets was presented to the meeting on June 26, by R. L. Kenyon, supervising research engineer, American Rolling Mill Co., Middletown, Ohio. For these tests, a low-carbon killed steel was used of uniform composition and structure throughout its thickness. Variation in thickness was obtained by etching in acid and the surface polished.

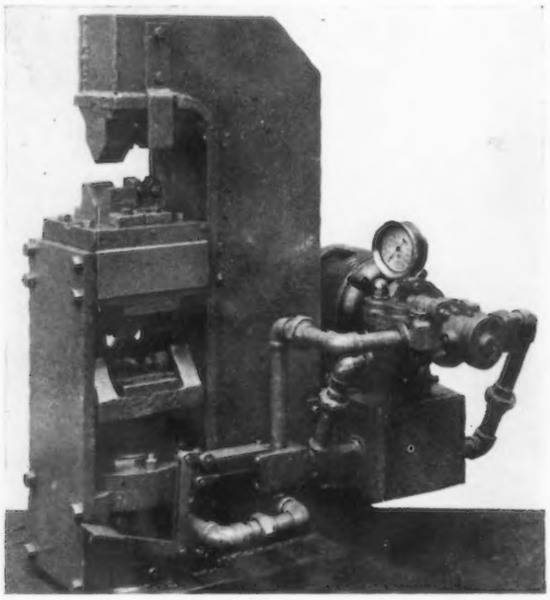
The appearance of a bulge under an impression on a polished specimen was taken as evidence that such a Rockwell reading is questionable. "The thickest specimen showing this," said Mr. Kenyon, "is either the thinnest one that gives accurate hardness values or the thickest one that gives erroneous results due to thickness effect." Mr. Kenyon regards it possible to determine a practical limiting thickness for various surfaces which will insure a maximum deviation of, say, two Rockwell numbers from the hardness of the material.

Hydraulically-Operated Rod-Forming Press, Straightener and Shear

THE rod forming press, straightener and shear illustrated, a new product of Williams, White & Co., Moline, Ill., is hydraulically operated and has capacity for rods up to 1 in. in diameter. It is suitable for bending gaggers, reclaiming bolts and tie rods, and for production bending and shearing operations.

Shearing and bending dies are in the upper block; the straightening dies are in the lower block and are made up of a series of V-blocks which overlap each other. It is stated that no change in set-up is necessary to perform any of the operations.

Hydraulic power is furnished by a self-contained pumping unit having large volume at low pressure for rapid traverse stroke, and small volume at high pressure for the working stroke. The unit is located at the rear, as shown, and the pumps are directly coupled to a 5-hp. motor. The unit includes release valves for cutting out the low-pressure pump at the end of the traverse stroke and the high-pressure pump when maximum load is reached, this safety feature serving to prevent breakage of the machine due to overload. Sensitive operation is obtainable through the foot treadle.



Capacity is for rods up to 1 in. in diameter. The press may be used for bending gaggers and reclaiming bolts and tie rods, as well as for production bending and shearing.

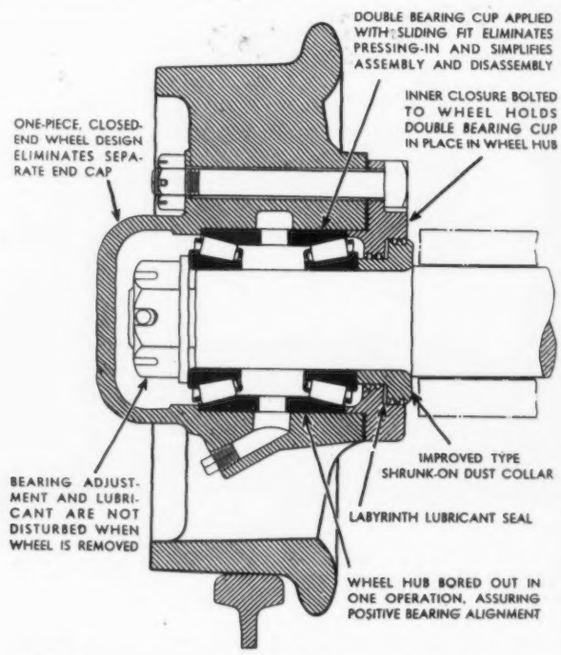
New Roller Bearing Mounting for Mine Cars

THE new type bearing mounting developed by the Timken Roller Bearing Co., Canton, Ohio, for mine car service, uses a double cup bearing instead of two single cups. The shrunk-in-place steel dust collar, a previous feature, has been modified to provide a labyrinth seal in conjunction with the inner closure. This eliminates the possibility of losing lubricant and prevents entrance of grit and water.

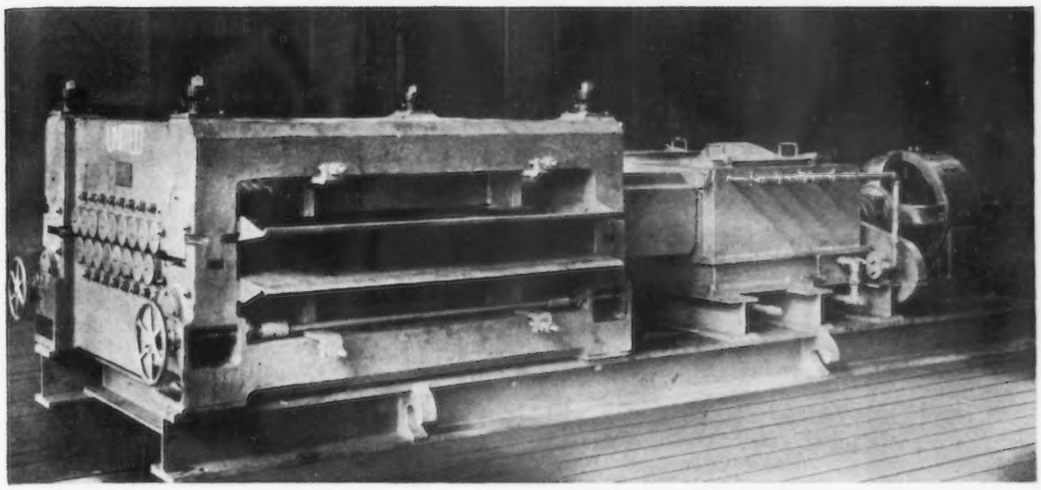
Outer sealing is assured by the elimination of separate end-caps on the wheels, the unit being cast in one piece, preventing loss of lubricant in service or the entrance of foreign matter into the bearing. Removing of the new type wheel merely requires loosening of the three bolts which clamp the inner closure and wheel in place.

In the new Timken mine car mounting the wheel hub is bored in a single operation, to assure correct bearing alinement and long bearing life. When wheel replacement is necessary or when it is desired to inspect the bearings, the wheel may be slipped off without disturbing the bearing adjustment. The bearing remains on the axle as a complete unit, the hub being machined for a slip fit over the bearing cup. This feature greatly facilitates wheel removal and decreases the cost of wheel replacement. It is unnecessary to bring a car equipped with the new bearing mountings into the shop to replace a wheel; it is stated that a wheel can be changed on the track in less than 15 min., and with no tools other than a car jack and a wrench.

Fundamental features of the present mine car application have been retained. Both types of mounting provide for inspection and easy wear adjustment. Radial and thrust loads are distributed evenly and both types are made from Timken special alloy steels. The new bearing mounting can be furnished in the closed end wheel, stub and extended axle types.


DOUBLE BEARING CUP APPLIED WITH SLIDING FIT ELIMINATES PRESSING-IN AND SIMPLIFIES ASSEMBLY AND DISASSEMBLY
INNER CLOSURE BOLTED TO WHEEL HOLDS DOUBLE BEARING CUP IN PLACE IN WHEEL HUB
ONE-PIECE, CLOSED-END WHEEL DESIGN ELIMINATES SEPARATE END CAP
BEARING ADJUSTMENT AND LUBRICANT ARE NOT DISTURBED WHEN WHEEL IS REMOVED
IMPROVED TYPE SHRUNK-ON DUST COLLAR
LABYRINTH LUBRICANT SEAL
WHEEL HUB BORED OUT IN ONE OPERATION, ASSURING POSITIVE BEARING ALIGNMENT

With the new mine car bearing mounting, loss of lubricant and entrance of foreign matter are eliminated. Also, wheels may be removed more conveniently.



ROLLER leveler of the United Engineering & Foundry Co. has rolls backing up the work rolls and all bearings are of the roller type.

Roller Leveling Machine for Light Gage Sheets

A ROLLER leveling machine for flattening light gage steel sheets has been designed and constructed by the United Engineering & Foundry Co., Pittsburgh. This machine, as illustrated, is of the close center staggered roller type with all of its 17 rolls driven through sleeve type universal couplings from a fully inclosed roller-bearing-mounted drive, equipped with a circulating oil system to provide a continuous flow of oil for gears and bearings. Backing rolls of the same diameter as the work rolls, but of about half their length, are mounted in two frames which are adjustable vertically by wedges to maintain proper contact with the straightening rolls at all times.

The complete top roll assembly is adjustable to four screws operated by worm gearing and hand wheels. The vertical opening between rolls is shown by four graduated drum type indicators, each of which is mounted on top of an adjusting screw. All bearings are roller type, and those for the rolls are provided with connections for pressure grease lubrication.

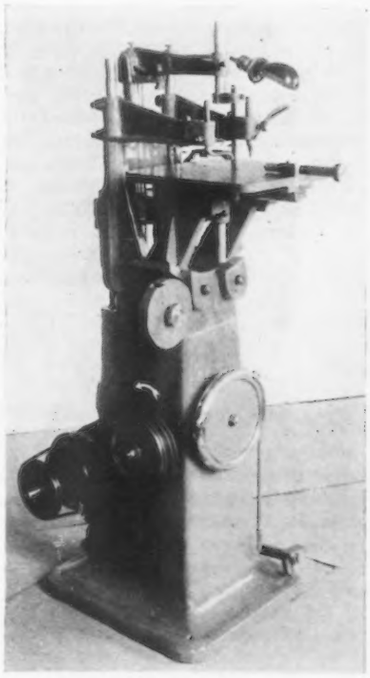
The drive case and base are built entirely of plates and beams, while the straightening roll assembly is a combination of cast and steel frames, to which are welded bearing supports formed of rolled slabs. The backing roll frames are constructed entirely of slabs welded together. These machines can be quickly adjusted to suit different gages of sheets, and the arrangement is such that the rolls can be readily removed for redressing and quickly replaced and adjusted.

Die-Making Machine with Hydraulic Feed

THE Oliver Instrument Co., Adrian, Mich., has brought out an improved machine equipped for the rapid production of dies and similar tools. The capacity is for sawing or filing in metal up to 3 in. in thickness, and filing in still heavier material with a short stroke. The stroke is adjustable from 0 to 5 in., and six speeds, from 100 to 300, are provided. Any type of parallel files or any size of saw can be held in the clamps without previous preparation.

The ram of the machine is made of 2-in. diameter steel tubing and has 10 in. of bearing. The arms that reciprocate the cutting tools are of rigid construction and are equipped with universal clamps which are adjustable vertically so that the file or saw may be held close to the work. The upper arm is hinged and has means of tensioning the saw; it can be turned back to facilitate removal of the work or it may be removed entirely if desired. Saw guides, provided above and below the table, may be adjusted or removed conveniently. An air pump furnishes a sufficient blast to keep the work always clean.

The table, of heavy construction, is 14 in. square, and tilts 15 deg. to the front, right and left, and 3 deg. to the rear. It is held on a heavy cradle, and where the lower end of the file is clamped is entirely open,



a feature said to add greatly to the ease of operating the machine. Permanent alinement of the cutting tool is assured by a crosshead which takes any side strain. This crosshead is equipped with adjustable bronze shoes for adjustment, if necessary.

A feature emphasized is the method employed to relieve the saw or file on the up-stroke and to feed the work while filing. A hydraulic feeding device provides a constant, predetermined pressure on the down-stroke of the ram and relieves the pressure entirely on the up-stroke, this feeding pressure being adjusted by means of a knurled knob at the side of the machine. The feeding device is arranged so that it requires the constant attention of the operator to his work. When left to itself it will feed a short distance and stop; thus work cannot be spoiled by an operator leaving the machine while it is running.

The machine is driven by a ¾-hp. motor, and is started and stopped by foot lever. Running parts are inclosed in an oil-tight case, and shafts are mounted in ball bearings.

The Refrigerating Machinery Association has moved its offices from 23 South Fifty-second Street, Philadelphia, to 915 Southern Building, Washington.

Purchasing Officials Discuss "New Deal"

W. S. Tower Among Speakers at N. A. P. A. Cleveland Convention

THE NRA, codes and controlled prices furnished subjects for practically all the papers and informal discussions at the nineteenth annual convention of the National Association of Purchasing Agents held at the Hotel Cleveland, Cleveland, June 18-21. Both praise and criticism were voiced for the New Deal and its accompanying industrial codes. However, the criticism was confined mostly to some of the features of the codes rather than to being general objections to the whole plan of government regulation of business under the NRA.

The recent revisions of the steel code were analyzed and the advantages of the changes pointed out in an address by Walter S. Tower, executive secretary of the American Iron and Steel Institute. "The changes," he said, "fell into three categories. Certain amendments relate to the pricing provisions; another group relates to the terms and conditions of sale and the third group relates to contracting provisions. All are of as much interest to the buyers as to the sellers of steel. These changes," he declared, "permit more flexibility in the adaptation of code provisions and to the daily conduct of the steel business."

"Having filed a price for a quarter, the price may not be increased during that quarter," was Mr. Tower's interpretation of one clause of the amended code regarding which there has been some difference of opinion. He admitted that the code does not specifically state this. However, it allows the seller to revise his price downward during that quarter and the only conclusion that can be drawn, he said, is that the price cannot be advanced during the quarter. The significance of this provision in the opinion of Mr. Tower is "that having once filed a price and then decided to lower it, there is no chance of retracing your steps and putting the price back to the level where it was. If you do reduce your price during a quarter you must stay with it through the balance of the quarter."

Provisions for Price Reduction

Another closely related new provision is one permitting a producer to immediately reduce his price on an uncompleted contract in case someone else files a lower price. Under the original code contracts stood as written. "This change," Mr. Tower pointed out, "is a more liberal provision for promoting keenness of competition among sellers. There is not a chance now that one purchaser of steel may find himself embarrassed by being a party to a contract at a time when some competitor not having been tied to a contract is free to buy his supplies at a newer lower price which has come into the market since the contract was made."

Mr. Tower explained the reason for and advantage of eliminating the 10-day waiting period after filing a price before it became effective and the substitution of a clause permitting a producer to name a lower price effective immediately to meet competition. "There is no chance, therefore," he said, "for one seller to get caught flat footed by a lower base price at his own basing point." He regarded this as a very important change.

Under the original code a producer could always meet the lowest price at other basing points than his own, but had to wait 10 days after filing before he could put in effect a new lower price at his own basing point. This change, Mr. Tower said, gives an added measure of active competition among sellers.

"The reasons for these changes in respect to the pricing provisions I think," said Mr. Tower, "could be fairly summarized as being for two purposes. In a way they help to bring the provisions of the code with regard to the filing of prices in accordance with the general practice of the industry in the way it had been conducting the better part of its business prior to the original date of the code. In the second place I think they were conceived and approved of by members of the industry as coming closer to creating conditions of equality in competition among the sellers and also among the purchasers of steel."

Changes in Terms of Sale

Mr. Tower outlined the changes in provisions covering terms of sale under the amended code. There is a grouping of invoices for taking cash discounts on the tenth and fifteenth of the month, this replacing the three times a month grouping. In addition there is a new provision allowing grouping of invoices for net payments once a month on the twentieth of the following month. Also more liberal terms are provided on merchant wire and tubular products.

The speaker referred to definitions that have been put into the code to clarify certain clauses relating to the contracting provisions that were formerly somewhat ambiguous. These in-

clude definitions of what constitute shipments, identified structures, all rail freight charges and mixed carloads and less than car lots.

Formal contracting under the revised code in the case of routine business for delivery during the quarter, in the opinion of Mr. Tower, is desirable only as a protection to assure deliveries.

A very explicit provision regarding contracts for identifying structures, he said, has replaced an ambiguous clause in the old code that caused trouble. Mr. Tower also called attention to a provision in the new code allowing the extension period beyond the quarter for certain specialties that require considerable time and processing. "That," he said, "is a readjustment of the problem of doing business partly for the seller and even more for the purchaser, because under the conditions as they originally were set forth it was almost impossible to do that class of business and do it honestly under the strict interpretation of the letter of the code."

Space Tells of Code Benefits

"The National Recovery Administration and the system of codes it has set up have demonstrated possibilities for good which justify their further continuance though within another year many of the present codes will hardly be recognizable," declared Frank G. Space, purchasing agent, Seymour Mfg. Co., Seymour, Conn., in a talk on the benefits to the purchasing agent under the codes. Desirable features of the codes will be retained in his opinion, and he believed that uniform prices permissible under the codes from a broad viewpoint are a good thing.

Purchasing agents, he said, are disposed to give undue importance to prices as related to the whole problem of competition. A refreshing evidence of new and better selling methods under the code is the fact that quality is again coming into its own. Uniform prices do not necessarily mean prices that are too high or that have been established on the basis of the profit motive alone without thought of the consumer's ability to pay. He credited industry with too much business acumen to price its products only on the basis of what traffic will bear. A price that is too high, even though it is standard throughout a given trade, will eventually drive the purchaser away to such an extent that it must seek a new level or the industry cannot survive.

"Collusion," Says Nicholson

An entirely different opinion of the control of prices by codes was expressed by Joseph W. Nicholson, purchasing agent of the City of Milwaukee, who declared that city, state and national governments are now confronted with the worst collusive price fixing combinations in history which have grown out of a misconstruction of the intent of the NRA. Codes, according to statements the speaker obtained from many public purchasing officers throughout the country, are being used as alibis for imposing exorbitant prices on the public. Industry, he declared, has demonstrated clearly that given a free hand to raise and control prices it cannot resist the siren call of greed. Price fixing in his opinion is unnecessary and if codes should provide only for fair wages and maximum hours the NRA will quickly lead industry out of the present emergency. If wages and hours are controlled, cutthroat competition cannot be resorted to. "Small industries," the speaker declared, "have been forced to raise prices to a common level by huge controlling monopolies."

Litchfield Sees Holes for Chiselers

"Principles behind the New Deal and the NRA are admirable, but certain classes are taking advantage of them," declared P. W. Litchfield, president, Goodyear Tire & Rubber Co., Akron, in a talk on industry's problems and programs. The administration efforts have been conscientious, but the voices of the demagogue, communists and self seeker have been loud in the land and they would not hesitate to destroy rather than build. "Unfortunately," he said, "those classes of labor which were least affected by the depression organized to take advantage of the situation to improve their own positions before the surplus of labor had been absorbed, causing an increase in prices which served to offset rising purchasing power. They were not willing to share with others a part of their work for the general good, but wanted the same or higher wages for less time and effort. It is this unwillingness to share that has made the results of the NRA up to date fall short of what was anticipated."

"If the NRA," continued Mr. Litchfield, "could be brought back to its simple functions of first reducing elastically the hours of human labor in order to spread the work over substantially all available workers; second, to establish minimum wages for the protection of the underdog in industry; third, protect fair prices and methods of competition endorsed by a preponderant majority against the selfish tactics of an unprincipled minority, letting the natural laws of supply and demand take care of the balance of the situation, it will go a long way towards straightening out many of our problems."

Stevenson Favors Price Regulation

Controlled competition, which he said meant price fixing, was advocated by Charles R. Stevenson, Stevenson, Jordan & Harrison, New York. The alternative is the continuance of unrestricted competition which he believed would destroy our capitalistic system. As all business is clothed with public interest, the same as transportation and public utilities, he believed that industry should fix its prices which should be enforced by law. These prices should be based on factors that would assure fairness to capital, management, labor and consumers, and should provide a reasonable return on the investment, no return to be figured for excessive valuation or watered capital.

A denial of the charge that the NRA has increased prices faster than purchasing power was made by Leon Henderson, director of research and planning division of the NRA. However, he admitted that some industries had boosted prices faster than the wage advance.

New Officers Elected

Donald G. Clark, purchasing agent, Brown & Sharpe Mfg. Co., Providence, R. I., was elected president of the association for the ensuing year. Walter M. Kirkman was elected vice-president at large.

Steel Workers Endorse Employee Representation

RESULTS of the final elections for representatives of steel workers for the purpose of collective bargaining have been disclosed by the American Iron and Steel Institute for seven companies employing a total of 214,561 workers, or a majority of all of the workers in the entire steel industry.

Inasmuch as officials of the Amalgamated have consistently urged members of their lodges to take no part in such elections and to refrain from voting, the results indicate a union following of not more than 10 per cent, which is just about what the industry has believed to be the percentage of union following in the steel industry. The Institute's statement is as follows:

Increased support of employee representation plans is shown by the larger vote turning out at the final elections as against that for the primaries preceding. Those voting in the final elections were over 90 per cent of the total number of eligible employees, compared with 85 per cent voting at the primaries.

While normally the turn-out for elections is somewhat more than for the primaries, the recent showing is considered

highly significant in view of the fact that the elections were held in the heat of publicity surrounding the recent convention in Pittsburgh of the Amalgamated Association of Iron, Steel and Tin Workers. Strike talk by union leaders clearly had the effect of causing an increasing number of employees to participate in their own method of choosing representatives for collective bargaining.

The figures for final votes cover the United States Steel Corpn., Youngstown Sheet & Tube Co., Jones & Laughlin Steel Corpn., Republic Steel Corpn., Sharon Steel Tube Co., Wheeling Steel Corpn., Pittsburgh Steel Co. and the Inland Steel Co.

The total number of employees eligible and available to vote in these companies was 214,561. Of this number, 193,362, or 90.12 per cent, cast ballots under the employee representation plans, indicating their participation and support in this form of collective bargaining.

These figures clearly confirm the position of the steel industry that strike talk by union leaders was not supported by the vast majority of employees.

At the Gary tin mill plant of the American Sheet & Tin Plate Co., the employees included on the ballot the question: "Are you in favor of terminating the plan of employee representation?" The vote in favor of continuing the plan constituted a majority of 73.6 per cent of employees voting.

Even though some employee representation plans make no restriction on the choice of employees as to their representatives, it is significant that in practically all cases employees only were placed for nomination for employee representatives.

At the Gary coke plant of the Illinois Steel Co., Ernest Curtis, a district organizer for the Amalgamated Association of Iron, Steel and Tin Workers, was nominated as an employee representative, but was defeated in the final election. No other outsiders were nominated at the plants of the United States Steel Corpn. out of a total of approximately 1900 nominations.

The total number of eligibles includes all employees below supervisory grade who are carried on the company pay rolls. Participation of 90 per cent of these employees in the balloting is significant, in view of the fact that many of the eligibles were absent because of part-time work or shut-down departments. In all cases elections are conducted and controlled by employees with no interference on the part of managements.

Results of final elections in June, 1934, for representatives for collective bargaining under employee representation plans in the steel industry are shown in the accompanying table.

Company or Corporation	Number of Employees Eligible and Available to Vote	Total Ballots Cast	Ratio in Per Cent Ballots Cast to Eligible Voters
U. S. Steel Corpn.—			
American Bridge Co	3,671	3,371	91.8
American Sheet & Tin Plate Co	23,769	21,929	92.26
American Steel & Wire Co	19,173	18,322	95.5
Carnegie Steel Co	28,496	25,164	88.31
Columbia Steel Co	4,051	2,857	70.5
Illinois Steel Co	23,479	19,913	84.81
Lorain Steel Co	1,032	961	93.0
National Tube Co	17,527	16,774	95.7
Oliver Iron Mining Co	3,742	3,587	95.9
Tennessee Coal, Iron and R. R. Co.	7,920	6,171	77.9
Total	132,860	119,049	89.60
Youngstown Sheet & Tube Co.—			
Campbell	8,029	7,648	95.2
Briar Hill	1,405	827	58.8
Indiana Harbor	4,346	3,602	83.0
South Chicago	330	271	82.2
Evanston	196	196	100.0
Total	14,306	12,544	87.7
Jones & Laughlin Steel Corpn.—			
Aliquippa	9,344	9,293	99.5
Pittsburgh	6,396	6,372	99.5
Total	15,740	15,665	99.5
Republic Steel Corpn.—			
Youngstown Dist	5,782	5,677	98.2
Warren Dist	6,059	4,727	78.0
Central Alloy Dist	7,570	7,053	93.1
Buffalo Dist	2,954	2,895	98.0
Chicago Dist	1,779	1,610	90.5
Upson Met. Div	1,117	1,086	97.2
Steel & Tubes, Inc	723	698	96.3
Berger Mfg. Co	440	307	69.3
Union Drawn Steel Co	890	858	96.4
Dilworth Porter Div	218	214	98.1
Canton Culvert Co	50	50	100.0
Northern Ore Mines	632	632	100.0
Birmingham Dist	645	643	99.7
Total	28,859	26,448	91.6
Sharon Steel Hoop Co	2,018	1,970	97.62
Wheeling Steel Corpn.—			
Steubenville	4,077	3,908	95.8
Yorkville	2,193	1,844	84.1
Beech Bottom	478	171	35.78
Whittaker	600	600	100.0
Total	7,348	6,523	88.77
Pittsburgh Steel Co.—			
Monessen	3,948	3,215	81.43
Allenport	1,502	1,059	70.56
Total	5,450	4,274	78.4
Inland Steel Co.—			
Indiana Harbor Pl	7,676	6,610	86.1
Morris Mine	87	87	100.0
Greenwood Mine	62	51	82.2
Inland Lime & Stone Co	155	141	91.0
Total	7,980	6,889	86.3
Grand total	214,561	193,362	90.12

Factory Employment Gained in May

FACTORY employment showed a gain of 0.1 per cent from April to May, while payrolls fell off 0.3 per cent.

The Bureau of Labor Statistics' general index of factory employment for May, 1934, is 82.4, this being the highest point reached since November, 1930. The May payroll index (67.1), while slightly lower than the April index, stands above the level of the payroll indexes recorded in any month between July, 1931, and March, 1934. During the preceding 15-year period, 1919-1933, inclusive, for which data are available in this Bureau, only 4 years showed gains in factory employment from April to May, while 8 years showed gains in payrolls.

The May, 1934, factory employment index is 31.6 per cent higher than the May, 1933, index (62.6). A similar comparison of payroll indexes shows a gain of 57.1 per cent in May, 1934, over the May, 1933, index (42.7).

The base used in computing these indexes is the average for the 3-year period, 1923-1925, which is taken as 100. (Prior to March, 1934, the indexes of factory employment and payrolls, which the Bureau of Labor Statistics published, were not adjusted to conform with the trends shown by biennial Census reports and were constructed with the 12-month average of 1926 taken as 100. Computed on the

old basis the employment index for May stands at 78.0 and the payroll index at 61.8.)

The indexes of factory employment and payrolls are computed from reports made by representative establishments in 90 important manufacturing industries of the country. In May reports were received from 22,705 establishments employing 3,810,136 wage earners, whose weekly earnings during the pay period ending nearest May 15 were $75,500,000. More than 50 per cent of the wage earners in all the manufacturing industries of the country were covered in these reports.

Increases in employment in May were shown in 48 of the 90 industries surveyed, while gains in payrolls were registered in 51 industries. The most pronounced percentage gain in employment was a seasonal rise of 22.7 per cent in the ice cream industry. Other large percentage gains in employment were reported in the following industries: The cement industry showed an increase of 20 per cent, beet sugar had a seasonal gain of 17.5 per cent, locomotives showed a rise of 15.5 per cent, carbuilding employment gained 9.6 per cent, brick, 8.7 per cent, and beverages, 8 per cent. Increases ranging from 5.0 per cent to 7.2 per cent were registered in stoves, sawmills, blast furnaces—steel works—rolling mills, and marble. In 17 of the 36 remaining industries in which increased employment was reported the gains ranged from 2.0 per cent to 4.6 per cent. Industries of major importance included in this group were slaughtering, structural and ornamental metalwork, steam and hot-water heating apparatus and steam fittings, steam railroad repair shops, foundry and machine-shop products, electrical machinery, apparatus, and supplies; millwork and book and job printing.

Century Electric Motors For Mississippi Project

CENTURY ELECTRIC CO., St. Louis, has received awards for supplying 112 motors for installation in 13 of the 16 dams to be erected between St. Louis and St. Paul in the Government's 9-ft. channel project on the Mississippi River. The motors will be of the "splash proof" model, and will be 10 and 25 hp. capacity.

A summary of mining costs, including iron mines, has been compiled by Charles F. Jackson, principal mining engineer, U. S. Bureau of Mines, and has been published in mimeographed form as information circular No. 6785, obtainable from the bureau. Data for some 100 mines of all descriptions have been gathered in the 47 pages. They cover costs of labor, tools, power, explosives, timber and other supplies.

Seasonal Lull Shows Its Effect on British Steel Market

LONDON, ENGLAND, June 26 (*By Cable*).—British iron and steel markets are experiencing a seasonal lull, customary at this time of year but less pronounced than usual. Pig iron demand is quieter, although consumption of all grades is still heavy. Hematite deliveries are well maintained but the pressure for deliveries is less insistent and there is less forward covering.

British consumers of semi-finished steel are buying Continental material because of the favorable price situation. Home production of semi-finished is in excess of demand, plate mills lack orders but rail makers and structural mills are busy.

Overseas demand for finished steel is maintained at good levels. Russia has exercised an option with British makers for further deliveries of approximately 20,000 tons of steel pipe.

A meeting will be held in Paris this week regarding international tin plate agreements, and prospects are believed to favor an accord. The agreement will probably establish higher prices and a buying wave may develop in the desire to cover.

British tin plate backlogs are still good, but export demand is dull and limited to small amounts. Continental iron and steel demand remains quiet with semi-finished varieties fairly active and a good demand for bars, although plates and sheets are dull.

At the recent London meeting of the International Raw Steel Cartel, the program for the third quarter was maintained at 525,000 tons. Great Britain is not as yet ready to negotiate membership.

International Rail Makers' Association, while nominally not altering prices, is prepared to meet competitors in all markets.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9		
Billets, open-hrth.	£5 10s.	to	£5 15s.
Tin plate, per base box	17s. 3d.	to	17s. 6d.
Steel bars, open-hearth	£7 17½s.		
Beams, open-hrth.	£7 7½s.		
Channels, open-hearth	£7 12½s.		
Angles, open-hearth	£7 7½s.		
Black sheets, No. 24 gage	£9 5s.		
Galvanized sheets, No. 24 gage	£11 5s.		

Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.

Billets, Thomas	£2 7s.		
Wire rods, No. 5 B.W.G.	£4 10s.		
Steel bars, merchant	£3 5s.		
Sheet bars	£2 8s.		
Plates, ¼ in. and up	£4		
Plates, 3/16 in. and 5 mm	£4 2s.	6d.	
Sheets, ⅛ in.	£4 7s.	6d.	
Beams, Thomas	£3 2s.	6d.	
Angles (Basic)	£3 2s.	6d.	
Hoops and strip base	£4 2s.	6d.	
Wire, plain, No. 8	£5 7s.	6d.	
Wire nails	£5 15s.		
Wire, barbed, 4-pt. No. 10 B.W.G.	£8 15s.		

Airplane Bids Extended to Aug. 27

AT the request of interested aircraft manufacturers, Eugene L. Vidal, Director of Aeronautics of the Department of Commerce, has extended the date for the opening of bids for 25 small, inexpensive two-seated airplanes from July 25 to Aug. 27. "The requests to extend the date included two reasons," Mr. Vidal said. "One was that some of the manufacturers plan to make models and conduct thorough wind tunnel tests. The second reason advanced was that the engineering staffs of other manufacturing companies are exceedingly busy at this time.

F.T.C. Dismisses Complaint Against Smelting Co.

WASHINGTON, June 26. — The Federal Trade Commission has dismissed a complaint against the American Smelting & Refining Co., in which it was charged with unlawful acquisition of the stock of the Federated Metals Corpn., competitor of the American Smelting & Refining Co. It was alleged that this acquisition tended to substantially lessen competition in the sale of non-ferrous metals, by-products and mixed metals and therefore was in violation of Section 7 of the Clayton act. In dismissing the complaint, the commission made it clear that it did so for lack of jurisdiction, indicating that, in its opinion, the acquisition might well be the basis for competition. In its opinion, the commission held that the basis for the position taken by the respondents must be that the substance of the transaction was an acquisition of the assets of the Federated company by the American Smelting & Refining Co. and not an acquisition of the stock of the type violative of the Clayton Act.

Flat Rolled Steel Sales Declined in May

SALES declined while production and shipments of sheet steel products in May reflected gains, according to the report of the National Association of Flat Rolled Steel Manufacturers, Pittsburgh. In this survey, which is based on figures covering a monthly capacity of 325,000 net tons, or approximately 59 per cent of the country's total capacity of 550,000 net tons, independent makers reported sales of 246,315 net tons in May, compared with 272,412 tons in April; production of 256,537 tons, against 214,522 tons, and shipments of 240,730 tons, compared with 184,042 tons. Unfilled tonnage on June 1 totaled 257,845 tons, or 79.4 per cent of capacity, compared with 251,123 tons or 77.3 per cent of capacity in the preceding month. The May report with comparisons of the two preceding months in net tons follows:

	May	April	March
Sales	246,315	272,412	158,244
Production	256,537	214,522	220,282
Shipments	240,730	184,042	200,701
Unfilled orders	257,845	251,123	159,672
Unshipped orders	88,796	82,113	57,212
Unsold stocks	48,714	53,683	57,722
Capacity per month	550,000	550,000	550,000
Percentage reporting	59.0	59.0	59.0
Percentages, Based on Capacity			
Sales	75.8	83.8	48.7
Production	79.0	66.0	67.8
Shipments	74.1	56.6	61.8
Unfilled orders	79.4	77.3	49.1
Unshipped orders	27.3	25.3	17.6
Unsold stocks	15.0	16.5	17.8

Ohio River Steel Movement in May

MOVEMENT of iron and steel products on the Ohio River in the Pittsburgh district in May amounted to 73,361 net tons, compared with 72,974 tons in April, 47,897 tons in March and 46,038 tons in May, 1933, according to the latest report of the United States Engineer Office, Pittsburgh. Total movements of steel products on the Monongahela River in May were 72,922 tons, compared with 51,995 tons in April, and 39,890 tons in May, 1933. Shipments of iron and steel on the Allegheny River last month totaled 3050 tons.

Protest Chicago Switching Rates

ATTORNEY generals acting for the States of Illinois and Indiana, and counsel for the Illinois Commerce Commission, Indiana Public Service Commission, the Chicago Board of Trade, and the Acme Steel Co., have petitioned the Supreme Court to reconsider its recent decision fixing rail rates in the Chicago switching district.

The petition contends that the court "misconceived, misapprehended, or overlooked certain important and controlling facts, in finding their decision." It is asserted that an Interstate Commerce Commission order fixing rates sustained by the court was "plainly lacking in the fundamental findings and supporting evidence."

Cleveland Steel Workers Appeal for Fair Play

Hon. Frances Perkins,
Secretary of Labor,
Washington, D. C.

Knowing the important position you are going to fulfill in the creation of the Labor Disputes Board for the steel industry, we the undersigned, speaking for 5700 steel workers in the Cleveland district wish to appeal to your sense of fairness to grant us representation on this proposed Board. Of 19,173 employees of the American Steel & Wire Co. eligible to vote in our recent elections, 18,322 or 95.5 per cent voted and elected 169 employee representatives to represent employees in collective bargaining with management through our Employee Representation Plan. Employees in most other companies in the steel industry also voted a very high percentage of eligible votes in the election of representatives, thus indicating that the large majority of employees in the steel industry have confidence in their Employee Representation Plan as effective instruments for collective bargaining. Our elections which were held on June 15 were conducted entirely by ourselves without any interference whatsoever by management and we intend to abide by the results of these elections.

The conduct and records of these elections we know will stand the scrutiny of any unprejudiced person. The representatives of one of our Cleveland plants, employing 3000 men, invited the Regional Labor Board to observe their election, an invitation which said Labor Board did not see fit to accept. It is only natural that we should resent the demands of the officers of the Amalgamated Association of Iron, Steel and Tin Workers to represent us on the contemplated Labor Board. They do not represent the employees of the American Steel & Wire Co., for in the 19 plants of this company situated in Massachusetts, Connecticut, New Jersey, Pennsylvania, Ohio, Indiana, Illinois, and Minnesota there is not organized a single local of the Amalgamated Association. From reports that seem to be authentic and from our knowledge as rank and file steel workers we honestly believe that less than 10 per cent of steel workers of the country are members of the Amalgamated Association. Even less than this number belong to the Steel and Metal Workers Industrial Union for the steel workers of this country are loyal, law abiding American citizens, strong supporters of President Roosevelt in the New Deal and have no sympathies with Communism. In view of the above facts it is only reasonable for us and other workers similarly organized as we are, making approximately 90 per cent of such workers in the steel industry, to expect representation on the proposed Labor Board. We the undersigned are a district committee representing four plants of the American Steel & Wire Co. located in Cleveland, Ohio, and are authorized by the employees of these four plants, through their mill committees, to transmit to you this message and to plead with you to preserve our organization which is working so satisfactorily in our relations with management by giving us unprejudiced recognition on this Labor Board. You have listened to the arguments of the officials of the Amalgamated Association of Iron, Steel and Tin Workers and we learn from the daily press that you are going to receive officials of the Steel and Metal Workers Industrial Union. We respectfully request that the interests of those organized in Employee Representation Plans be given similar consideration. We are taking this action entirely on our own initiative as representatives of the employees of the American Steel & Wire Co. in the Cleveland district and intend to send a copy of this telegram to the Employees Representatives of other plants of our company to inform them of our action, believing that they will agree with us in this action and we hope that they inform you of their similar beliefs.

(Sd.) Bernhardt Bohne
John Wennerstrom
Stanley F. Jenkins
Frank G. Mog
Roy H. Cawood
Albert Melichar
John Frye
John Vidmar

Westinghouse Gets Large Steel Electrification Order

THE Westinghouse Electric & Mfg. Co., East Pittsburgh, has been awarded an order aggregating nearly $1,000,000 for steel mill electrical equipment by the Mesta Machine Co. at West Homestead, Pa. The electrical equipment, consisting of motors, control material, motor generator sets and auxiliary units, will be installed on a 76-in. strip mill, being constructed by the Mesta company for the Youngstown Sheet & Tube Co. Six 3500 hp. motors will be included in the order, on which work will begin immediately at East Pittsburgh, and completed in less than six months.

The Heine Boiler Works, St. Louis, was sold at a foreclosure sale under a Federal Court Order to Superheater Co., New York, for $201,000, the minimum price set by Judge Faris, who ordered the sale as the final step in a receivership action. Frederick A. Schaff, president of the Superheater Co., said the new owner will continue to operate the Heine plant for the manufacture of boilers for power purposes.

... PERSONALS ...

E. H. HUGHES, who has been associated with Jones & Laughlin Steel Corpn. since 1916, and as manager of the company's Memphis, Tenn., warehouse since 1926, on July 1 will become assistant manager of the steel construction department at Pittsburgh, He will be succeeded at Memphis by E. W. HARWELL as district sales manager, and E. E. HOEHLE as assistant district sales manager. DAVID S. GASTON, who, for many years, was manager of tin plate sales for Follansbee Brothers Co., Pittsburgh, will join the Jones & Laughlin tin plate sales department on July 1.

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EVERETT E. RADCLIFFE, who for the past 14 years has been associated with the general offices of the Union Carbide & Carbon Corpn., New York, has organized the firm of E. E. Radcliffe & Co., Cleveland, to act as distributers for the corporation's products, Prest-O-Weld welding and cutting apparatus, Oxweld welding rods and supplies, Purox electrodes, Carbic flood lights and Haynes Stellite rods. Office and warehouse have been established at 2032 East Twenty-second Street, in that city. Mr. Radcliffe has been identified with the oxy-acetylene welding and cutting industry since its beginning in the United States, having been employed by the Linde Air Products Co. in 1909, shortly after it put its first liquefaction oxygen plant into operation at Buffalo. Later he was district sales manager for the Linde company for Ohio, Kentucky and southeastern Michigan. He served in the same capacity for the Oxweld Acetylene Co. after that company was formed in 1912, and took over the welding and cutting apparatus business of the Linde company. In 1920 he was transferred to the general offices in New York City, where he has since served in the capacity of New York district sales manager, eastern division process service engineer, eastern division sales manager for the Linde Air Products Co., and in other executive capacities with various units of the Union Carbide & Carbon Corpn.

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EDWARD A. JOHNSTON and ALBERT A. JONES have been elected vice-presidents of the International Harvester Co. The former will be vice-president in charge of engineering and the latter will have charge of manufacturing.

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H. D. RUNCIMAN has become associated with the Precision Grinding Wheel Co., Inc., Philadelphia. He will make his headquarters at that company's Detroit office, 2832 East Grand Boulevard.

J. R. BATEMAN has been added to the sales staff of the Bunting Brass & Bronze Co., Toledo, with headquarters in Chicago. He will cover Illinois, Wisconsin, Missouri, Iowa and Kansas. J. F. ROBERTS has been appointed manager of the Bunting branch at Dallas, Tex., R. H. ROBERTS, manager of the Kansas City branch, and F. W. ROBERTS, manager of the office serving Metropolitan New York.

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B. K. PAGET, formerly connected with John J. Nesbitt, Inc., and the L. J. Wing Mfg. Co., New York, in heating and ventilating sales work, has been placed in charge of ventilator sales by the Swartwout Co., Cleveland.

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WILLIAM C. DICKEY, New York sales agent for the Worth Steel Co. and the New Haven Copper Co., is scheduled to sail for Europe on June 30 on a short trip.

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GEORGE W. FARNY has been appointed administrator on the code authority of the nickel and nickel alloys industry, lead industry and toll bridge industry.

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R. GREEN ANNAN has been elected president of the Union Mining Co., Mount Savage, Md., which operates coal and clay mines and which has acquired the plant of the Maryland Fire Brick Co., also of Mount Savage. WILLIAM L. SHERMAN has been made vice-president; J. E. MCKELVY, secretary-treasurer, and HOWARD L. ALDRIDGE, assistant secretary-treasurer and plant superintendent.

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S. V. ALLTMONT, who has been in charge of the water cooler division of the Kelvinator Corpn., has been appointed head of the newly created liquid cooling division of the company.

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M. B. TENNENT has been made vice-president of the Pacific Iron & Steel Co., Tacoma, Wash. He was formerly head of the Tennent Steel Casting Co.

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PAUL FIELDEN, credit manager of the Norton Co., Worcester, Mass., has been elected a director of the National Association of Credit Men. He has been connected with the company for about 15 years.

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FRANCIS B. FOLEY, of the Midvale Co., has been elected chairman of the Philadelphia chapter of the American Society for Metals for the season of 1934-1935. GEORGE W. KELLER, Brown Instrument Co., has been made vice-chairman, and ADOLPH O. SCHAEFER, of the Midvale Co., is secretary-treasurer.

ROBERT L. HOUSTON, deputy administrator in Division VII of the NRA, has been appointed to succeed HARRY O. KING as divisional administrator of Division IV. Mr. King several days ago was granted a leave of absence to serve as impartial administrator for the copper industry until organization of the copper code authority is completed and under way.

Mr. Houston was for several years with the National Cash Register Co., in charge of that company's advertising and publicity, and later became associated with THOMAS J. WATSON, chairman of the International Business Machines Corpn., as vice-president in charge of plants.

ALLIS-CHALMERS MFG. Co., announces the appointment of W. R. Judson as manager of the Salt Lake City district office, located in the Kearns Building, Salt Lake City. For the past three years Mr. Judson has been managing director of Allis-Chalmers (France), representing the Allis-Chalmers Mfg. Co. in Europe. Prior to that time, for 13 years, he was manager of the company office at Santiago, Chile, covering Chile, Peru and Bolivia.

In Salt Lake, Mr. Judson succeeds H. E. Weiss, who has been transferred to the company's office at Kansas City.

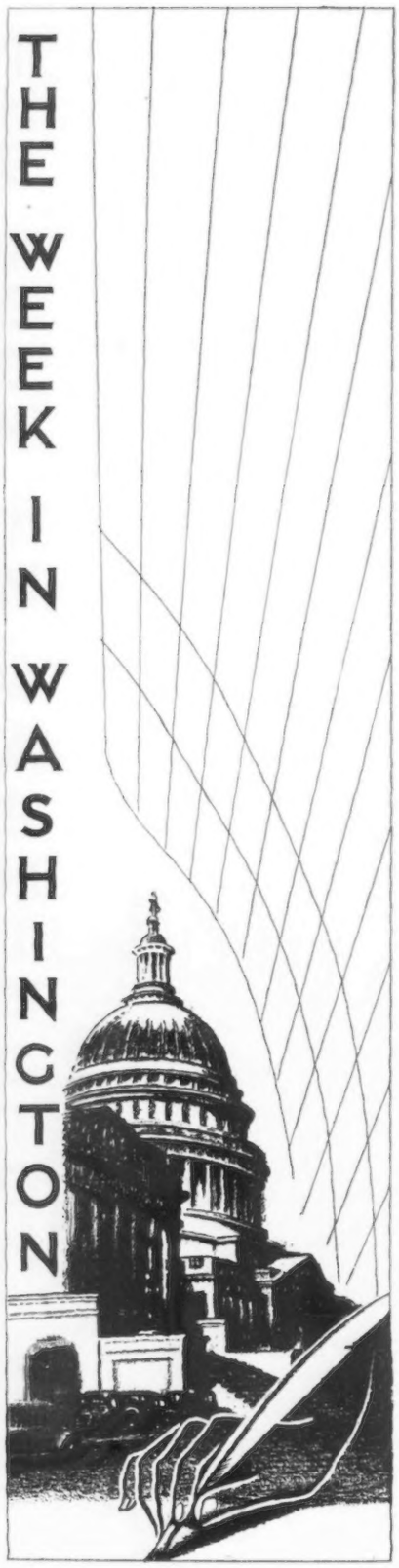
May Iron and Steel Exports Increase

WASHINGTON, June 26.—Exports of iron and steel in May aggregated 241,753 gross tons, compared with 201,530 tons in April, according to the iron and steel division, Bureau of Foreign and Domestic Commerce. Exports of scrap in May totaled 132,725 tons, compared with 126,687 tons in the preceding month. The other item which brought the May export total above that of April consisted of skelp, outgoing shipments of which totaled 31,882 tons.

Motor Vehicles Off In May

MOTOR vehicle production in the United States in May declined to 331,641 from 354,745 in April, according to the Bureau of the Census. Passenger car output dropped to 273,765 from 289,030 while truck production fell to 57,876 against 65,714. In the first five months of the present year, however, motor vehicle production aggregated 1,406,263, compared with 743,287 in the corresponding period of last year, a gain of almost 89 per cent.

Jones Announces Industry Loan Regulations



PWA Steps on Allotment Accelerator— Federal Housing Plans Pushed

By L. W. MOFFETT
Resident Washington Editor, The Iron Age

WASHINGTON, June 26.—With the Public Works Administration granted $750,000,000 by the new deficiency appropriation act, speeding up of projects has begun by the special board for public works and some 500 undertakings already have been approved.

The PWA, however, still is working on its original appropriation of $3,300,000,000, finding that it likely will have to redistribute large allocations because recipients have not fulfilled their agreements.

Administrator Ickes has served notice that 563 more non-federal allotments will be rescinded beyond 97 already rescinded unless the recipients take immediate steps to get their projects under construction. The 563 allotments total $158,558,517, and the projects for which they were allotted are located in every state except Idaho. In some instances, he stated, local controversy or legislation, beyond federal control have blocked construction. These allocations were for municipalities and in most instances they have not been followed by drawing on the federal treasury because taxpayers have voted down the necessary bond issues.

Threatens Laggards with Reallocation

Mr. Ickes said that unless the allocations are drawn up soon, the money will be reallotted to "some of the other projects which are clamoring for funds and which we won't be able to take care of from the new appropriation." Among the more important allocations in the different states which face rescission are: New York, $36,164,700; California, $19,960,810; Minnesota, $18,869,000; Texas, $16,923,900; Nebraska, $15,094,151.

Included in the New York list are $23,160,000 for completion of the subway system; $4,000,000 for completion of three incinerators and $2,268,000 for furnishing and equipping of school buildings.

Again, with the United States treasury the chief banker, programs are under way or being whipped into shape rapidly to aid industry and employment. The Reconstruction Finance Corpn. has started operations of making direct loans to industry through recently enacted legislation. To the alphabetical soup has been added another condiment, F. H. A.—Federal Housing Administration—with what its proponents have declared will be a far-reaching home building and modernization program. With bureaus, commissions, and board being set almost endlessly by the federal government, difficulty is being experienced in finding quarters and the F. H. A. is endeavoring to find space for its large personnel.

Jones Announces Industry Loan Regulations

The regulations under which the RFC will make direct loans to industry were announced last Thursday by Chairman Jesse H. Jones, who said he had then approved about $500,000 in industrial loans. The entire total available is $580,000,000, but a like sum is possible through participation by Federal Reserve and other banks. The RFC proposes to bring its lending program from this fund to an end next January.

Loans, to be made for working capital and similar purposes, will be examined by industrial advisory boards to be set up in the 32 cities where the RFC has loan agencies. Applications are to be made to these offices. None will be received directly in Washington. The maximum amount of a loan is $500,000. Loans are to be made at prevailing bank rates and the maximum period for loans is five years. Save for exceptional cases loans cannot be made to pay debts and construction loans will be granted only when they will insure more effectual operation. Regulations also provide that consumer purchases, instalment sales or similar contracts can not be made objects for loans nor can they be made to finance imports and ex-

ports or promotional work. Borrowers are required to abide by NRA codes, cannot declare dividends while still owing money to the RFC unless given permission by the corporation to do so. The RFC also reserves the right to limit salaries of borrowers.

Federal Housing Activities

The F. H. A. is headed by Harry L. Hopkins, relief director, and is expected to operate under the NEC—National Emergency Council—with offices set up throughout the country. It is proposed to stimulate with the aid of a tremendous publicity campaign a home building and modernization program entailing $1,500,000,000 within the next 12 months.

Underlying the plan is a form of federal insurance of individual mortgages up to 80 per cent of the appraised value of new homes. The federal guarantee on repairs is 20 per cent. While the bill for setting up this plan passed Congress by a heavy majority, its opponents condemned it as offering the possibility of endangering government credit, not by reason of this act itself, but because of the precedent it sets for other such legislation. The risks taken by the government in making guarantees were held to be unwise. Sponsors, however, say the measure, highly involved, offers ample safeguards.

The ponderous Department of Commerce and other new government buildings are falling far short of providing necessary facilities for the expanding army of government employees these days.

Washington Getting too Small

Despite the enormous increase in government-owned space in Washington, the personnel has become so great that there is an overflow in numerous private office buildings. Within one year the administration has added 77,122 employees on its payroll. According to the latest report of the Civil Service Commission there were 644,108 civilian employees working for the executive branch of the Federal Government throughout the country at the end of April and the Commission reports most of them have been appointed without benefit of the merit system.

The comparatively large and fine Interior building now has become too small. It was built during the Wilson administration. Secretary of the Interior Ickes is going to have another building put up.

"The congestion in Government office space in Washington has become so acute that in order to relieve the situation it has been decided not only to go ahead at once with the erection of a new Interior building but, if possible, to make a new record in building speed for such a structure. Every existing building is overflowing, and all available space in other office buildings has been contracted for."

Code Doings and Undoings

Fabricated Metal Code Authorities

Chain manufacturing: A. P. Van Schaick, director, American Chain Co., Bridgeport, Conn.; F. A. Bond, vice-president, McKay Co., Pittsburgh; L. B. Cull, secretary-treasurer, Cleveland Chain Manufacturing Co., Cleveland; F. G. Hodell, treasurer, the Chain Products Co., Cleveland; D. S. Brisbin, vice-president, Columbus-McKinnon Chain Corpn., Tonawanda, N. Y.; E. W. Taylor, vice-president, S. G. Taylor Chain Co., Hammond, Ind.; Edgar Littmann, president, Nixdorff-Krein Mfg. Co., St. Louis, and Adolph Kurz, director, Western Chain Products Co., Chicago.

Electric industrial truck manufacturing: James C. Morgan, vice-presidents, Yale & Towne Mfg. Co., Philadelphia; E. J. Bartlett, president, Baker-Raulang Co., Cleveland; S. K. Towson, assistant general manager, Elwell-Parker Electric Co., Cleveland; T. W. Saitta, secretary, Crescent Truck Co., Lebanon, Pa.; L. J. Kline, general manager, Mercury Mfg. Co., Chicago and R. C. Haggerty, secretary-treasurer, Easton Car & Construction Co., Easton, Pa.

Chain hoist manufacturing: D. S. Brisbin, vice-president, Chisholm Moore Hoist Corpn., Tonawanda, N. Y.; A. P. Van Schaick, director, American Chain Co., York, Pa.; A. M. Harrington, treasurer, Harrington Co., Philadelphia; L. D. Cull, secretary-treasurer, David Round & Son, Cleveland; James C. Morgan, vice-president, Yale & Towne Mfg. Co., Philadelphia and Carl S. Neumann, president, Union Mfg. Co., New Britain, Conn.

Porcelain enameling manufacturing: Chairman, Rudolph W. Staud, president, Porcelain Enamel Institute and representing Benjamin Electric Manufacturing Co., Des Plaines, Ill.; representing jobbing shop division, Earle S. Smith, president, Toledo Porcelain Enamel Products Co., Toledo, O.; Louis Ingram, president, Ingram-Richardson Mfg. Co., Beaver Falls, Pa.; representing sign division, George S. Blome, vice-president, Baltimore Enamel & Novelty Co., Baltimore; F. E. Hodek, Jr., secretary-treasurer, General Porcelain Enameling & Mfg. Co., Chicago, representing table top division, R. G. Calton, vice-president, Tennessee Enamel Mfg. Co., Nashville, Tenn.; Edgar Weil, president, Vitreous Steel Products Co., Cleveland; representing fruit division, R. A. Weaver, president, Ferro Enamel Corpn., Cleveland; William Hogenson, president, Chicago, Vitreous Enamel Products Co., Cicero, Ill.; member-at-large, Emery L. Lasier, vice-president, Titanium Alloy Mfg. Co., Niagara Falls, N. Y., and non-member of Porcelain Enamel Institute, H. H. Wineburgh, vice-president, Texlite, Inc., New York.

National screw machine products manufacturing: George Briggs, Screw Machine Products Corpn., Providence; Robert T. Frisbie, New Britain Machine Co., New Britain, Conn.; T. L. Strimple, The National Acme Co., Cleveland; C. C. Heath, Brown-McLaren Mfg. Co., Detroit; H. E. Penfield, Chicago Screw Co., Chicago; Archibald R. Lemieux, Wright Machine Co., Worcester, Mass., and H. W. Armstrong, Cornwall & Patterson Mfg. Co., Bridgeport, Conn.

L. S. Peregoy, of the Sivyer Steel Casting Co., Milwaukee, was also recognized as an additional member of the steel casting code authority.

Administration Member of Three Code Authorities

Administrator Johnson has announced the appointment of George W. Farny of Craftsman Farms, Morris Plains, N. J., as administrator on the code authority of the following industries:

Nickel and nickel alloys industry, lead industry and toll bridge industry.

Fabricated Metal Products

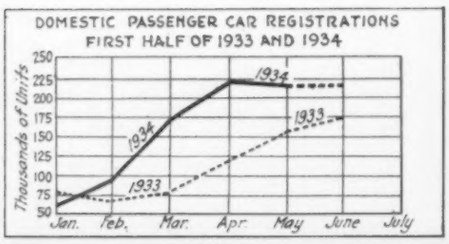
ACTING Division Administrator Barton W. Murray has approved a plan submitted by the code authority for the fabricated metal products manufacturing and metal finishing and metal coating industry for the administration of the fair trade practice provisions of the code and has authorized the code authority to handle all trade practice complaints. The order specifies that complaints by one member of the industry against another for failure to comply with the labor provisions of the code, shall be classed as trade practice complaints.

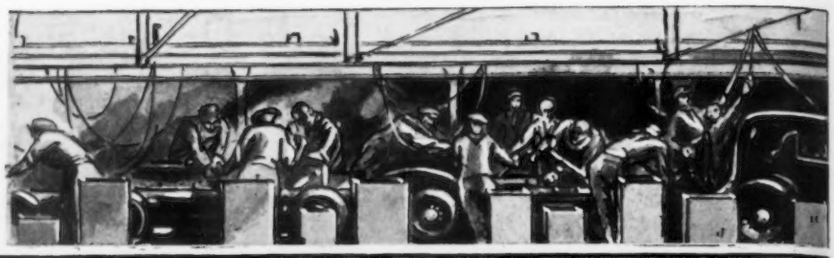
Administrator Johnson has approved amendments to the codes for the marking devices industry and the gray iron foundry industry, which permit the Code Authorities for the two industries to submit budgets and schedules of contributions, for the support of code administration, to the administrator for his approval.

Automotive Parts and Equipment: Modification

THE National Recovery Administration has given notice of a proposal to modify the code for the automotive parts and equipment industry by the addition of amendments affecting a budget for the administration of the code and the basis of contribution toward such budget of expense. Criticisms of, objections to or suggestions concerning the proposed modifications

(Concluded on page 80)





THIS WEEK ON THE

Wave of Car Buying Follows Price Reductions

DETROIT, June 26.

PRICE cuts have brought more business to car manufacturers than they had expected, with the result that production schedules of Chevrolet and Plymouth have been boosted. Plymouth has just completed the most spectacular week in its history. On Monday it made 1898 cars, Tuesday 1983, Wednesday 1986 and Thursday 2113, setting a new record on four successive days for a single day's assemblies.

Plymouth has received orders this month for over $28,000,000 worth of cars and its factory has turned out 27,000 units since June 1. For the week ended June 16, its dealers sold 8745 cars, a gain of 25 per cent over the previous week. The experience of Dodge dealers the same week was gratifying, an increase of 22.5 per cent being registered in retail deliveries.

Chevrolet reversed the seasonal trend by selling to consumers 25,935 units in the first 10 days of June, compared with 21,688 units in the corresponding period in May. The upturn in Chevrolet sales has been so pronounced that Fisher Body Corpn. has bought steel for 50,000 more Chevrolet cars than it had counted on. Purchased at the old price, this steel is to be shipped to Fisher's Cleveland plant. Chevrolet has tentatively raised its projected July assemblies from 73,000 to 90,000 units. Incidentally, the tentative schedules of automobile manufacturers have little meaning other than to indicate the direction in which companies are thinking. Actual production is adjusted three or four times a month to conform to retail sales.

Hudson and Terraplane sales have risen 16.7 per cent since prices were decreased. Even Buick, without benefit of lower prices, sold to customers 2125 cars in the first 10 days of June, as against 2111 in the last 10 days of May. However, this is partially explained by the fact that Buick was delayed from getting into production on its model 40 by the Fisher Body strike at Flint.

Car Makers Uncertain About Future

How well retail car sales will be sustained, now that the first wave of buying following the price cut has about passed, is a question to which no manufacturer is willing to venture a definite answer. The industry literally is going from week to week molding its policies to the exigencies of the moment. Asked what he thought business would be like in August, the president of a prominent motor car company declared, "I shouldn't be so foolish as to say, because I don't know. Neither does anyone else."

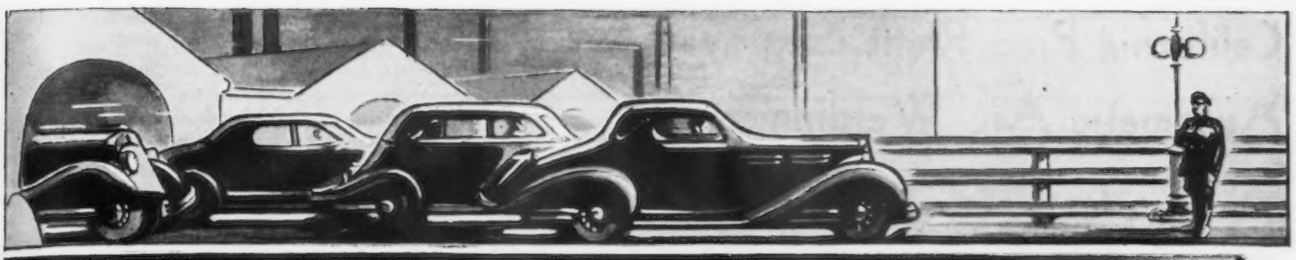
Even though the sales pictures may be considerably altered from week to week, the industry is leaning strongly to the opinion that the usual decline in buying during July and August may not be so sharp as exected. The first basis for this belief is that the public's response to price cuts has been more than gratifying. The second reason is discernment of a returning tide of confidence on the part of the country generally following a period of nervousness. Adjournment of Congress and realization on the part of business and industry that the threat of further legislation is temporarily removed are helping to instill a better feeling in all sections.

Accompanying price reductions is perhaps the most intensive early summer drive for sales ever conducted by the automobile industry. This promotional campaign is bound to aid business to some extent. Expansion of the lines offered by several companies, through the introduction of new models, should be of assistance. Plymouth has gone farther than other makers in this respect, having four lines of cars from $35 to $50 apart in price. Three of them—Plymouth Standard Six, Plymouth Special Six and Plymouth Six—are on a 108-in. wheelbase; the fourth—Plymouth De Luxe Six—is on a 114-in. wheelbase. The Standard Six, of course, is a car stripped of all extra contraptions and designed primarily for the fleet trade, which considers economy of operation a prime essential.

Pontiac Spends $200,000 for Equipment

With short-term planning apparently the only feasible policy just now, most equipment buying programs are more uncertain than they were several weeks ago. Pontiac is the only company which has gone through with its plans, but not until they were scaled down to a fraction of the amount originally to be expended. Pontiac has placed orders for new machine tools and for the rebuilding of old equipment at a total cost of over $200,000. It is understood that the bulk of this business went to one builder. This marks the start of work on Pontiac's six for 1935, which probably will be introduced in October.

What Packard will do in the way of capital expenditures for new equipment for its light eight is not yet known. The story is that two elements in the company are at odds on this point. The new executives who have charge of preparations for the light job favor new production machinery; the older group of executives



ASSEMBLY LINE

By BURNHAM FINNEY
Detroit Editor, THE IRON AGE

still have to be convinced such purchases are necessary.

The Packard plant already is being radically altered. As reported in this column some weeks ago, the new car will be built in that portion of the Packard factory across Grand Boulevard from the office building. A new plating department is being installed and an elaborate conveying system set up. When work is completed, Packard will be able to make far more cars in the same manufacturing space than it formerly did.

Jobs to Be Refigured

While machine tool companies have outstanding inquiries totaling probably $2,000,000, there is a growing conviction that much of this business will not materialize. Some of the programs included in this amount are believed to have been abandoned and others, if they are revived, will have to be refigured practically on the basis of entirely new jobs. At this time motor car manufacturers are notably hesitant about spending large sums for mechanical changes for 1935. One low-price car maker, which has been expecting to adopt a new motor for next year, has decided to retain its present engine, possibly with a few minor alterations.

The fact is becoming increasingly clear that whatever changes are made in 1935 will mostly relate to body designs. The tendency toward streamlining will be given further impetus. The Airflow design already has left an indelible mark on the industry and next year's cars will be influenced by it. The twenty-thousandth Airflow car soon will be produced. Next year's Chrysler and De Soto Airflows will carry the aerodynamic design a step further. De Soto is being well received in all parts of the country, and prospects are excellent for exceeding the management's sales forecast during the remainder of the year.

General Motors is reported to be ready to go to more pronounced streamlining in 1935, probably following the design of the present La Salle, with its long narrow radiator. Tool and die shops in the Detroit district are looking for the first batch of orders for next year's cars to be placed this week. Foundries specializing in the casting of large dies are counting on this work to revive lanquishing operations.

Studebaker, scheduled to bring out new models this week, has increased its output the past week. Graham-Paige is reported to have been negotiating to take over materials and parts for assembly of several thousand Continental cars, thereby cleaning up stocks which Continental has had on hand for months. However, a possibility exists that this deal may not be consummated.

Automobile makers still are hammering away at parts suppliers in efforts to secure concessions on second half contracts. The situation has settled down to a matter of individual bargaining, with the parts manufacturers in some cases being granted renewals of contracts at prices which previously prevailed. The settlement, in certain instances, has represented a paring down of 5 per cent. Automobile purchasing officials would like to extend the price shading to steel, but have not yet made any open proposals along this line.

Ford, which is reported to have scheduled 65,000 cars for July, is understood to have increased its proposed output to 80,000 to 85,000 cars because of increased sales resulting from recent price cuts. One of the encouraging developments the past week has been the upward revision of the projected production in July by the industry's two major manufacturers, Chevrolet and Ford.

Ford officials are believed to be favoring the policy of replacing a number of the present machine tools at Dearborn with more modern machinery of a highly automatic type. Machinery now under consideration by Ford is said to carry automatic operation one step farther than it ever has gone before.

Several automobile companies, including Ford, did some shopping around last week to place last-minute tonnage with steel mills at the old price. Chevrolet is reported about ready to give releases on a moderate tonnage of flat-rolled steel for its Flint plant at the new prices.

Andre Citroen in France is turning out the first chassisless car. The body and frame, of steel construction, are a single unit. The car has a front-wheel drive, the transmission being immediately behind the radiator. All four wheels are independently sprung. The "backbone" of the car is a sheet steel platform, the front of which is shaped so that it becomes the seat for the engine. The center portion of the platform is the floor of the car. At its extreme end is attached the rear axle, which is of the trailing type to carry the rear wheels. On top of the platform is welded the body. The car is powered by a four-cylinder engine and has a three-bearing crankshaft.

Detroit Notes

Tires made entirely of synthetic rubber have been built by the Dayton Rubber Mfg. Co., Dayton, Ohio. Subjected to grueling tests, they have proved themselves as tough and durable as tires made of natural rubber. Du Prene, a synthetic rubber developed by Du Pont, was used in processing these tires, which were built with the same machinery used to produce natural rubber tires. . . . Up to June 10, Dodge dealers this year had sold 89,726 Dodge and Plymouth passenger cars and 20,380 trucks, a total of 110,106 units, compared with 58,999 in the same period last year. . . . Charles B. Bohn, president of the Bohn Aluminum & Brass Corpn., states that his company has been experimenting in new metals for bearings and that "one of the metals which has given interesting and promising results is cadmium." . . . Midland Steel Products Co. has purchased land on Mt. Elliott Avenue in Detroit from the Packard Motor Car Co. and is reported to have plans to build a plant there soon.

It is believed that a considerable number of automobile makers, including a leading company in the low-price field, will close down for the week of July 1. With the industry heading into the dull season and with the Fourth of July holiday coming in the middle of the week, manufacturers believe that next week will be a good time to reduce activities.

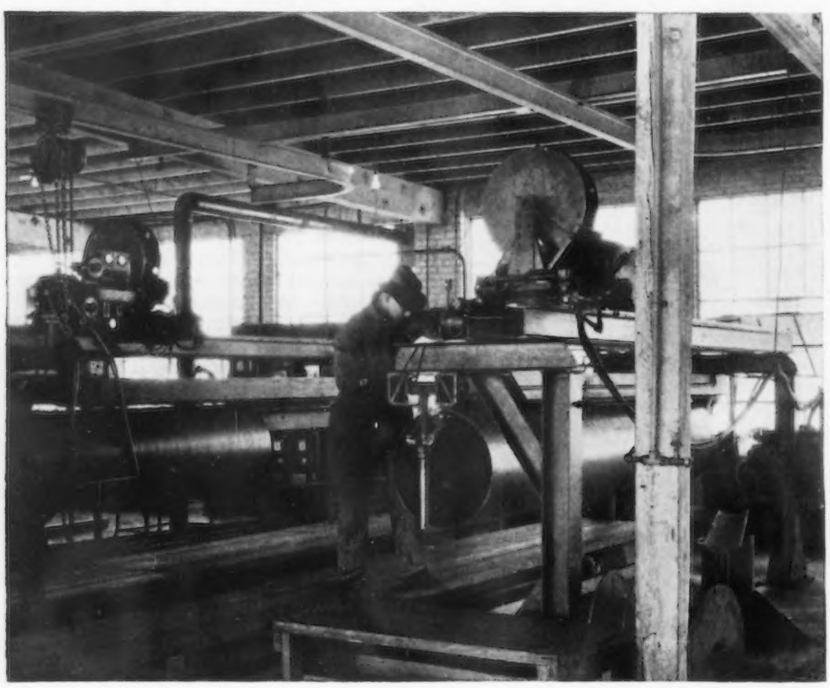
California Pipe Plant Employs Automatic Arc Welding

AUTOMATIC arc welding is employed by the Southern Pipe & Casing Co., Azusa, Cal., in the fabrication of pipe, which is produced in all sizes from 4 in. up, from steel ranging from No. 14 gage to ⅜ in. in thickness.

The plant has capacity for producing from 500 to 2000 ft. per day, depending upon pipe size. Although Azusa is not in the industrial center of southern California, it is in the middle of an excellent market for pipe for water supply and irrigation projects.

Previous to welding, flat sheets or plates are formed cold by die pressing and rolling. The formed material then goes to one of two welding machines equipped with General Electric Co. automatic arc-welding heads and travel carriages. Welding is done with G-E type B welding electrodes and speeds as high as 30 in. per min. are attained on pipe with the thinnest walls, namely, 14-gage. Each welder has its own constant-potential welding generator, resistor, and reactor—with welding currents running as high as 500 amp. for the heavier pipes and welding electrodes. Two G-E single-operator welding sets are used for miscellaneous work, such as tacking.

Two standard 12-ft. lengths of pipe are welded together to form one 24-ft. section. After welding, the pipe is hot-dipped in asphaltum to provide a protective coating. When specified additional coating is applied in the form of an asphalt-impregnated felt, which is wrapped spirally around the previously cool pipe with a 1-in. lap, additional hot asphalt being used to cement it to the dipped pipe.



National Council of Auto Unions Formed

A NATIONAL council designed to create stronger unions throughout the automobile industry was formed at the first national conference of the United Automobile Workers Federal Labor Unions which met in a two-day session at the Fort Wayne Hotel in Detroit Saturday and Sunday. The council is to be financed by the American Federation of Labor on condition that it is to name the chairman and that only such matters as may be presented by the Federation representative be given consideration by the council.

The council is to have eleven members four or whom are to be from Michigan and two from Ohio. One member each is allotted to Illinois and Indiana, to Wisconsin, to the West, to the South and to the East. It is assumed that William Collins national A.F.L. representative at Detroit will become chairman of the council.

Approval of the plan for a council was voted by a narrow margin with several of the 130-odd delegates averring that a split may occur in labor's ranks—as a result of disagreement over the plan. The conference adopted a resolution requesting President Roosevelt to clarify the relations of the parts industry to the production business "either by creating a board to handle the auto parts and equipment problems or by placing the entire jurisdiction with the present automobile labor board." Another resolution demanded that General Johnson permit the workers to consider at a public hearing the provisions of any new codes which may be instituted after September when the present automobile code becomes inoperative. A third resolution vigorously attacked company unions and asked President Roosevelt to direct the Automobile Labor Board to investigate charges that workers have been coerced into joining them.

Other resolutions condemned the Ford Motor Co. for—

"Failure to live up to the seniority rulings of the Automobile Labor Board" and requested that board to investigate the speed of production lines, job insecurity, discrimination, wage standards and unemployment problems confronting older workers. William Green, president of the A. F. L., was the principal speaker at the conference and proposed the council plan which was adopted.

Am. Locomotive, Railway Steel-Spring Consolidate

EFFECTIVE on May 31, 1934, the business of Railway Steel-Spring Co., which has been a wholly owned subsidiary of American Locomotive Co. since 1926, was consolidated with the parent company and the business heretofore conducted by the Railway Steel-Spring Co. will hereafter be carried on by American Locomotive Company, Railway Steel-Spring Division.

In the consolidation the American Locomotive Co. acquired the assets of the Railway Steel-Spring Co., including the manufacturing plants, sales orders and contracts, and the operating, sales and administrative personnel, and assumed all the liabilities, including contracts and orders for the purchase of materials and supplies.

Alexander S. Henry, president of the Railway Steel-Spring Co., has been appointed vice-president of American Locomotive Co., Railway Steel-Spring Division.

Steel Production Curtailed Sharply To Meet Seasonal Demands

Rate of Output Declines 12 Points to 48 Per Cent of Capacity As Mills Begin to Adjust Operations to Consuming Levels

SHARP curtailment in steel production, which had been widely predicted in the trade following general price advances in April and May, has materialized according to expectations. While a 20 per cent decline in output, or from 60 to 48 per cent of capacity, in a single week was rather drastic, it is explained by the fact that raw steel production has recently been maintained at an artificially high rate in order to supply the diversified needs of finishing mills which must complete shipments against second quarter contracts this week in order to comply with code regulations.

Current ingot production is particularly hard to gage as furnaces are being taken off daily and some companies began the week with a rate of output fully 20 per cent higher than that at which they will finish the period. Declines have been general throughout the country, the only exceptions being at Birmingham and Detroit where production is unchanged.

MOST of the steel being rolled this week was produced in the last fortnight as it was necessary for producers to risk no interruption in their rolling schedules because of a lack of the proper form and analysis of raw steel. While the threat of a strike earlier in the month may have prompted the accumulation of slightly larger semi-finished steel inventories than probable rolling mill requirements seemed to warrant, this factor seems to have been somewhat overemphasized.

That curtailment will continue next week is a foregone conclusion. A check will be offered by the necessity for building up raw steel inventories which have been depleted by heavy June shipments, but steel companies will then regulate production to the rate of consumptive demand. The extent of such demand is the principal question confronting the industry today.

BUILDING operations financed by Government funds are likely to be affected least by summer inactivity. Such projects are not influenced by code restrictions and shipments of structural steel reinforcing bars, sheet steel piling and other building products will go on as usual during the next two months to jobs which are already under way. However, backlogs for this type of work are not especially heavy.

Structural steel awards during the last week amounted to only 8700 tons, compared with 28,000 tons in the preceding week. New projects, calling for 26,750 tons of structural steel, were much more encouraging. In New York pier sheds on the North River will take 8100 tons. Government-financed bridges and viaducts in the Chicago area bulk rather large, the outstanding prospective job being a toll structure across the Mississippi at Bettendorf, Iowa, which will require 5200 tons of shapes. Considerable Federal dam work is also in the offing.

CONTRACT tonnage to be shipped to the railroads during July and August may not support steel production as much as was at first indicated. At Chicago rail production is likely to continue at about 40 per cent of capacity during the next two months, but the Pittsburgh district unit is not so well occupied and will complete its commitments in another month. The Birmingham mill is not scheduled beyond July 15.

The trend of steel consumption by the automotive industry is still difficult to discern, but seems more encouraging. Price reductions have undoubtedly increased retail deliveries this month, one large producer estimating that 150,000 units will be added to its sales this season by this move. Automobile makers are practically the only large steel consumers which have placed any business for third quarter delivery. At Cleveland a fair tonnage of sheets and strip steel has been placed with the understanding that if shipment cannot be made by June 30, July delivery at third quarter prices will be accepted.

RECENT price changes have been negligible. Bars and semi-finished steel at Duluth will be reduced $1 a ton on June 30 and a Cleveland maker of cold-finished bars has filed a price $1 under recent levels, effective July 1. This figure may not be met by other sellers. THE IRON AGE composite prices for pig iron, finished steel and scrap all are unchanged.

THE threat of labor troubles has practically ceased to be a factor in the current steel picture. This week's sharp drop in production indicates that operations are no longer being influenced and the handling of the situation at Washington is believed to be entirely satisfactory. Differences between the arbitration plans suggested by the industry and the Amalgamated association are being adjusted and under the labor disputes resolution recently adopted by Congress, a labor board of three which would be satisfactory to all concerned is expected to be established by executive order this week.

▲▲▲ A Comparison of Prices ▲▲▲

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	June 26, 1934	June 19, 1934	May 29, 1934	June 27, 1933
Per Gross Ton:				
No. 2 fdy., Philadelphia	$20.26	$20.26	$20.26	$16.34
No. 2, Valley furnace	18.50	18.50	18.50	15.50
No. 2 Southern, Cin'ti	19.13	19.13	19.13	16.51
No. 2, Birmingham†	14.50	14.50	14.50	12.00
No. 2 foundry, Chicago*	18.50	18.50	18.50	16.00
Basic, del'd eastern Pa.	19.76	19.76	19.76	16.09
Basic, Valley furnace	18.00	18.00	18.00	15.00
Valley Bessemer, del'd P'gh.	20.76	20.76	20.76	17.89
Malleable, Chicago*	18.50	18.50	18.50	16.00
Malleable, Valley	18.50	18.50	18.50	15.50
L. S. charcoal, Chicago	24.04	24.04	24.04	23.17
Ferromanganese, seab'd carlots	85.00	85.00	85.00	68.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$36.37½	$36.37½	$36.37½	$40.00
Light rails, Pittsburgh	35.00	35.00	35.00	30.00
Rerolling billets, Pittsburgh	29.00	29.00	29.00	26.00
Sheet bars, Pittsburgh	30.00	30.00	30.00	26.00
Slabs, Pittsburgh	29.00	29.00	29.00	26.00
Forging billets, Pittsburgh	34.00	34.00	34.00	31.00
Wire rods, Pittsburgh	38.00	38.00	38.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.70	1.70	1.70	1.60

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.90	1.90	1.90	1.60
Bars, Chicago	1.95	1.95	1.95	1.70
Bars, Cleveland	1.95	1.95	1.95	1.65
Bars, New York	2.23	2.23	2.23	1.95
Plates, Pittsburgh	1.85	1.85	1.85	1.60
Plates, Chicago	1.90	1.90	1.90	1.70
Plates, New York	2.13	2.13	2.13	1.598
Structural shapes, Pittsburgh	1.85	1.85	1.85	1.60
Structural shapes, Chicago	1.90	1.90	1.90	1.70
Structural shapes, New York	2.10¼	2.10¼	2.10¼	1.86775
Cold-finished bars, Pittsburgh	2.10	2.10	2.10	1.70
Hot-rolled strips, Pittsburgh	2.00	2.00	2.00	1.55
Cold-rolled strips, Pittsburgh	2.80	2.80	2.80	2.00

Finished Steel

	June 26, 1934	June 19, 1934	May 29, 1934	June 27, 1933
Per Lb.:	Cents	Cents	Cents	Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.65	2.65	2.65	2.10
Hot-rolled annealed sheets, No. 24, Gary	2.75	2.75	2.75	2.20
Sheets, galv., No. 24, P'gh	3.25	3.25	3.25	2.70
Sheets, galv., No. 24, Gary	3.35	3.35	3.35	2.80
Hot-rolled sheets, No. 10, P'gh	2.00	2.00	2.00	1.50
Hot-rolled sheets, No. 10, Gary	2.10	2.10	2.10	1.60
Wire nails, Pittsburgh	2.60	2.60	2.60	1.85
Wire nails, Chicago dist. mill	2.65	2.65	2.65	1.90
Plain wire, Pittsburgh	2.30	2.30	2.30	2.10
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.15
Barbed wire, galv., Pittsburgh	3.00	3.00	3.00	2.35
Barbed wire, galv., Chicago dist. mill	3.05	3.05	3.05	2.40
Tin plate, 100 lb. box, P'gh.	$5.25	$5.25	$5.25	$4.25

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$11.75	$11.75	$12.00	$11.75
Heavy melting steel, Phila.	10.50	10.50	10.50	9.25
Heavy melting steel, Ch'go	9.75	9.75	10.25	9.25
Carwheels, Chicago	9.75	9.75	10.25	9.50
Carwheels, Philadelphia	12.50	12.50	12.50	10.25
No. 1 cast, Pittsburgh	12.25	12.25	12.25	10.50
No. 1 cast, Philadelphia	12.25	12.25	12.25	10.25
No. 1 cast, Ch'go, (net ton)	7.50	7.50	8.00	8.75
No. 1 RR. wrot., Phila.	12.25	12.25	12.25	10.75
No. 1 wrot., Ch'go, (net)	7.50	7.50	8.00	6.50

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.85	$3.85	$3.85	$2.00
Foundry coke, prompt	4.60	4.60	4.60	2.75

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery‡	8.75	8.75	8.25	7.75
Lake copper, New York‡	9.12½	9.12½	8.62½	8.00
Tin (Straits), New York	50.87½	51.25	53.40	44.95
Zinc, East St. Louis	4.20	4.25	4.35	4.35
Zinc, New York	4.55	4.60	4.70	4.72
Lead, St. Louis	3.85	3.85	3.85	4.05
Lead, New York	4.00	4.00	4.00	4.20
Antimony (Asiatic), N. Y.	7.80	7.90	8.37½	6.50

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables. ‡Blue Eagle copper.

▲ ▲ ▲

▲▲▲ The Iron Age Composite Prices ▲▲▲

	Finished Steel	Pig Iron	Steel Scrap
June 26, 1934	2.199c. a Lb.	$17.90 a Gross Ton	$10.67 a Gross Ton
One week ago	2.199c.	17.90	10.67
One month ago	2.199c.	17.90	10.92
One year ago	1.904c.	15.01	10.08
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	High	Low	High	Low	High	Low
1934	2.199c., April 24	2.008c., Jan. 2	$17.90, May 1	$16.90, Jan. 27	$13.00, Mar. 13	$10.67, June 5
1933	2.015c., Oct. 3	1.867c., April 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.42, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Production Off Sharply In Pittsburgh Territory

Declines of 12 Points in Pittsburgh and Valley Districts and 15 Points at Wheeling Are Reported—Rolling Schedules Not Yet Affected Greatly

PITTSBURGH, June 26.—With raw steel output having caught up with finishing mill requirements last week, open-hearth operations have slumped sharply in the current period. In the Pittsburgh district a 12-point drop has sent the rate down to 42 per cent, and an identical decline places output in the Valleys and nearby northern Ohio mills at 50 per cent. Production in the Wheeling district this week will average 15 points lower at 63 per cent.

The rather precipitate drop in output in the Tri-State producing centers is not unusual in the face of circumstances. Production of ingots for rolling against second quarter steel contract tonnage reached the peak the middle of last week, and the final rush to produce and ship against these orders has since fallen upon finishing mills. Moreover, many uncertainties that had stymied the placing of forward business have kept backlogs for third quarter at a low point, and production of steel for that period has practically not begun.

The pressure upon some finishing mills has been so great that producers have not been able to accept spot orders offered them during the latter half of June. The urgent character of such tonnage, which would have been placed at the new prices, suggests prospects of at least a moderate amount of spot business for July. A general liquidation of consumer stocks, representing an aftermath of the unusually heavy buying at old prices in the second quarter, will undoubtedly take place before steel purchasing broadens out in the third quarter.

Backlogs of rails and track accessories and structural material in this district are too light to offer support to July operations. The local rail mill is rolling only 4000 to 6000 tons of rails a week, and expects to fulfill its commitments probably by the end of July. Sheet mill operations are averaging 60 per cent, and will likely end the week below that pace. Tin plate operations are holding very well at 70 per cent, while strip mills are tending lower at about 55 per cent.

Bolt, nut and rivet prices have been reaffirmed for third quarter. Scrap is inactive and unchanged.

Pig Iron

Shipments against low-priced second quarter orders are being released freely, and little doubt exists that full tonnages will be taken by most consumers by the code deadline on June 30. Spot business at the new prices, which apply through third quarter, has been negligible. The prospect of important buying by non-integrated steel companies of basic and Bessemer grades becomes more vague, with a general recession in business expected in July. Foundry melt in this vicinity has declined, with little chance for early improvement in sight.

Semi-Finished Steel

Consumers are somewhat more wary in accepting deliveries in the face of an expected sharp decline in operations at the beginning of third quarter. In the case of skelp, however, no let-down has occurred. The movement of sheet bars and slabs is slower, while interest in wire rods is noticeably less. Third quarter coverage at the higher prices will likely not gain headway until well into July.

Bolts, Nuts and Rivets

Present prices were reaffirmed on June 18 for third quarter. Machine and carriage bolts are quoted at 70 per cent off list, and small rivets at 70 and 5. Large rivets are posted at $3, base, per 100 lb., Pittsburgh or Cleveland. Third quarter contracting is expected to be on a restricted basis, in view of seasonal tendencies in consuming lines.

Rails and Track Accessories

Except for meager backlogs of rail and track accessory tonnage entered under special code provision for delivery through August, mills in this district boast of little railroad business. The influx of usual orders for track repairs and maintenance is not sufficient to maintain steady operating schedules.

Bars

Few bar mills will experience difficulty in shipping out second quarter commitments by the code deadline on June 30. Some spot business is being accepted for merchant steel bars, but in the case of alloy bars, which must undergo processing, it is impossible for producers to accept further second quarter business. Forward buying against third quarter contracts has thus far been nil, and producers do not expect much tonnage, at least for July.

Billet steel reinforcing mills are busily engaged in producing tonnage specified against low priced second quarter contracts for shipment by June 30. Practically all of such tonnage is against general contracts. New specifications, both private and public, are very meager. Dam work offers the best prospect at the moment for heavy tonnage.

Cold-Finished Steel Bars

Specifications appear to have leveled off, with little change in volume reported for the week. Seasonal tendencies in the agricultural implement field are beginning to exert a slowing influence. Motor car manufacturers are not particularly active in the market. Lacking the incentive of price advance for third quarter, jobbers have been moderate in recent coverage. Prospects for third quarter business are somewhat brighter than for other steel products, since cold-finished bar users generally have restricted second quarter purchases to actual needs, and will enter third quarter with only limited inventories.

Plates and Shapes

Compared with other units, plate mills are comparatively quiet. The usual channels for tonnage are at present devoid of any activity. This is particularly true in the case of projected barge work and tank construction. Plate mills in this district have not benefited to any extent by the recent flurry in railroad car construction.

New inquiries for structural steel are holding up fairly well. About 4100 tons will be needed for a Ford Motor Co. mill building at Dearborn, Mich. A warehouse for the United States Bureau of Mines at Pittsburgh will take 410 tons. The Westinghouse Air Brake Co. plans a building at Wilmerding, Pa., which will require about 200 tons. Bids for the Binghamton, N. Y., post office have been readvertised for the third time. Awards for the week were featured by 3800 tons for the South Omaha River bridge at Omaha, Neb., to American Bridge Co.

Tubular Products

Pipe mill schedules are holding to the recent pace set by an exceptionally heavy call for oil country goods. In one or two cases, some carryovers of second quarter tonnage may have to be canceled, but in most instances all second quarter tonnage will be shipped out by the end of the month. Although some improvement has been experienced in standard pipe consumption, it has been too slight to account for much of the current activity. Tube mills are comparative laggards, with

demand for seamless steel boiler tubes and lap-welded steel pressure tubes rather quiet. Mechanical tubing is still affected by limited specifications from the motor car industry.

Wire Products

Wire mills are virtually coasting over the last week of June, and will experience little hardship in meeting delivery deadline on June 30. Wire mill operations are consequently tending downward this week, and will probably fall below 50 per cent of capacity.

Sheets

Mill operations are largely concentrated at finishing units in the final rush to meet the code deadline on June 30. Hot rolling is on a greatly reduced scale, since producers have very limited backlogs beyond second quarter. It is estimated that operations for the sheet group this week will be as much as ten points off the recent rate. Some fluctuation during the current week at various mills is expected, and an average for the period is placed at about 60 per cent. Prospects for July sheet business are buoyed up by reported plans for increasing automobile production in that month.

Tin Plate

Operations in the tin plate industry are holding unusually well at 70 per cent of capacity. Little doubt exists, however, that production is outrunning specifications and represents tonnage in anticipation of shipping releases against orders. Part of the sustained activity is attributable to the final rush on tin mill black plate contracts booked at pre-advance prices.

Strip Steel

Operations this week have been revised downward to about 55 per cent of capacity. Some mills are sold up on cold-rolled output for the remainder of the month, while others are fully booked on hot-rolled items. Very little business has been placed at the new prices of 2c. a lb. for hot-rolled strip, and 2.80c. a lb. for cold-rolled strip, Pittsburgh, for third quarter shipment. Some hope for early buying in July is sustained by reports of heavier schedules for that month in the automotive industry, which has taken limited tonnage of strip for the past six weeks.

Coal and Coke

The lull that has set in in this market seems to be in anticipation of general industrial inertia expected in July. Important inquiry is absent, and activity in the spot market is likewise depressed. Connellsville coke for prompt shipment is quotable at $3.85 for furnace, and $4.60 for foundry, ovens.

Scrap

The sharp downward course of open-hearth operations in the Pittsburgh and nearby steel producing centers this week has arrested trading in this market. Large and small dealers are seemingly disposed to await more definite business prospects after the turn of the quarter before actively soliciting scrap orders. This passive attitude has practically dried up all distress material in the open market. At least one strong underlying factor is discernible in that most consumers are entering third quarter with lean inventories. Imperative replenishment of stocks, however, will probably depend chiefly upon the trend in open-hearth activity late in July. In the current absence of trading all prices are nominally unchanged.

Pig Iron Shipments Heavy at St. Louis

ST. LOUIS, June 26.—Shipments of pig iron during the last week continued heavy. It is expected that melters will take all that they have contracted for for shipment this quarter in view of the fact that virtually all of this business was placed at a price $1 below present quotations. It is believed that July shipments will show a considerable falling off. The melt in the stove industry is beginning to taper.

Westinghouse Electric & Mfg. Co., which received an order for 4300 units of hollow spun concrete tapered piling to be used in Twin Locks No. 26 at Alton, Ill., has divided the order for 1000 tons of reinforcement equally between the Laclede Steel Co. and the Missouri Rolling Mills Corpn.

Scrap

Prices of scrap iron are nominally unchanged, there being very little trading. Because of low price, movement from the country is negligible. The St. Louis-San Francisco Railroad has a list with approximately 7000 tons of scrap.

Large Railroad Car Orders Placed in South

BIRMINGHAM, June 26.—As the June 30 deadline approaches, pig iron shipments are growing in size. Throughout the month there has been a steady movement, increased at this time by foundries that postponed their deliveries as long as possible. Practically all of the iron moving this quarter was purchased at $13.50 and foundries have been stocking up in view of the fact that the current price is $14.50. The foundry melt has lagged far behind deliveries and it is believed that most foundries now have stocks sufficient for quite a while. This condition will adversely affect buying activity in the third quarter. Ten blast furnaces are in operation, this number not having been changed in several months.

Although there were more bid openings in June than during any other month of the year, Birmingham pipe plants will ship less tonnage this month than in May. Most of the lettings were tentative and are held up for the time being. San Francisco divided 9300 tons between American Cast Iron Pipe, National Cast Iron Pipe and United States Pipe & Foundry, the major portion having gone to the latter company. Pipe prices have been advanced $2 a ton.

Steel

Shipments this month have been the heaviest in nearly a year. Jobbers, dealers and industrial buyers of general lines have specified heavily against contracts placed at prices lower than those now prevailing.

Both manufacturers of steel in this district have closed their books on sheets, one several weeks ago and the other last week, as their entire supply up to June 30 is already taken. Wire products have also been in heavy demand.

The Pullman Car & Mfg. Co. has been awarded two car orders. This will make possible the reopening of its Bessemer plant, closed for three years. Production will probably start late in July or early in August. Central of Georgia Railway placed an order for 200 70-ton hopper cars and Seaboard Airline has bought 700 all-steel box cars with wood lining.

It is now reported that the Ensley rail mill will be closed down around July 15. No additional rail tonnage is in sight.

Virginia Bridge & Iron Co. is expecting an early release on 1200 tons of structural steel for a bridge on the Myrtlewood extension of the Meridian & Bigbee Railroad out of Meridian, Miss.

Fifteen open-hearth furnaces operated last week and the current week finds the same number active.

Inform-A-Show Prizes Awarded

THE Youngstown Sheet & Tube Co. was awarded the first prize for the most effective exhibit at the Inform-A-Show held in connection with the annual meeting of the National Association of Purchasing Agents in Cleveland last week. The Scovill Mfg. Co., Waterbury, Conn., took the first prize for the most attractive exhibit.

BEARING steel must be clean steel, and by clean we mean just about the closest approach to the absolute in cleanliness that has been attained in steel-making. This is so important because, in steel of the extreme hardness used in bearings, the most minute inclusion may form the nucleus of a fracture.

Cleanliness is, of course, fundamental and taken for granted in making all alloy steels. But in making bearing steels Bethlehem enforces a standard of cleanliness as far ahead of the usual standards of good practice as the surgeon's standard of cleanliness is ahead of the layman's.

In addition to cleanliness, Bethlehem Bearing Steels have machinability that keeps production costs low, uniform heat-treating characteristics that simplify control of the hardening operations, and controlled grain-size that assures the maximum physical properties that the analysis is capable of developing.

No wonder Bethlehem's output of bearing steel is steadily increasing.

BETHLEHEM STEEL — *BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.*

BETHLEHEM *fine* ALLOY STEELS

Chicago Steel Output Drops to 52 Per Cent

Decline of 13 Points Foreshadows Further Curtailment Next Month — Large PWA Projects Give Improved Tone to Structural Market

CHICAGO, June 26.—Raw steel production in this district has dropped 13 points to 52 per cent of capacity and a further recession in coming weeks is looked for. Pig iron output is being curtailed also, the leading interest having taken off two blast furnaces, one at Gary and one at South Works. Sheet and strip mills are still operating at a high rate turning out steel for shipment prior to July 1. The heavier rolled products, which to a considerable extent are free from calendar quarter restrictions as to shipments, will be the chief reliance of steel makers until fresh buying of the lighter products revives.

Just how low ingot production in this district will fall during the summer cannot be accurately forecast, but it would not be surprising if operations dipped to 35 or 40 per cent of capacity. Actual consumption of steel, as measured by warehouse business, has fallen off less than seasonally, but this showing cannot be maintained if labor disturbances among steel users continue to spread.

The most encouraging feature of the current market is an increase in structural business, chiefly bridges and viaducts financed by Government money. A bridge to be built over the Mississippi at Bettendorf, Iowa, will require 5200 tons. The State of Illinois has just awarded two large viaducts, one for Madison County, calling for 1000 tons, and another for Peoria, requiring 700 tons. Two State bridges on which bids are being taken today involve 1000 tons each. Considerable additional Government dam work is due to come before the trade soon, and numerous post office jobs will reach the inquiry stage. Reductions of $1 a ton on merchant bars and semi-finished steel at Duluth go into effect June 30, cutting the differential above Chicago to $2 a ton.

Pig Iron

Shipments are the largest in several years. The June total to date is fully 66 2/3 per cent above May. Little new business has been booked and furnaces will produce largely for stock in July. No early change in merchant furnace operations in this district is contemplated. One Iroquois and one Federal furnace are active and will probably be kept in blast. To the east of Chicago, however, some curtailment would not be surprising, with the possibility that a Toledo stack may be taken off in the near future.

Coke

Foundry coke shipments, which are a better measure of melt than pig iron deliveries, are 17 per cent below those of May. No change in foundry coke prices is expected.

Reinforcing Bars

Contrary to expectations, the market appears to be listless. If there is a change in the attitude of private enterprise it is toward the more conservative side. The bulk of tonnage now moving from shops and the projects that are on drawing boards are almost without exception of the type that depend on public expenditures. Illinois has opened bids on 700 tons and the Chicago Sanitary District is still negotiating for 1200 tons for sewer projects Nos. 9 and 10.

Cast Iron Pipe

Demand remains very light and sellers see little ahead of them in the way of attractive tonnages. Sales are confined to carload lots. Aberdeen, S. D., has placed a general contract which calls for 10,000 ft. of 16-in. pipe. No word has reached Chicago as to the disposal of 700 tons being sought by Madison, Wis.

Plates

No new railroad equipment work is reported in this territory, and inquiry for oil storage tanks and gas holders is lacking. Considerable tank work has been held back by uncertainties arising from the petroleum code and by labor unrest at the refineries.

Structural Material

An unusually large amount of bridge and viaduct work, most of it financed by Government funds, is coming up for bids. The bridge commission of the City of Davenport, Iowa, has asked for figures on a toll bridge over the Mississippi River at Bettendorf, Iowa, which will require 5200 tons. Fabricators' bids are being taken today on two Illinois State bridges to be erected near Lamont which call for 1000 tons each. Low bidders have just been announced on four Illinois State viaducts which will take a total of 2600 tons. Few sizable lettings have been reported, but 19 small awards account for a total of 3050 tons.

Bars

Specifications are holding up well. In fact, the decline in releases from the automobile industry has been smaller than was expected and apparently has been arrested. Recent price reductions on passenger automobiles are said to have stimulated retail sales. The Wisconsin producer of cars is reported to be operating at more than 80 per cent of capacity. Farm equipment makers are completing their spring manufacturing programs, but are still fairly busy in their tractor departments. They are enjoying a fair run of foreign business, mostly in tractors.

Wire Products

Wire mills are still running at 60 to 65 per cent of capacity, but operations are expected to fall off 10 or 15 points in July and August. There has been a sharp decline in automobile tonnage and releases from the jobbing trade are still exceedingly conservative notwithstanding recent rains in the drought-stricken areas.

Rail and Track Supplies

Rail mill schedules vary little from week to week and are expected to continue at an average rate of about 40 per cent through July and August. Demand for light rails is lacking.

Warehouse Business

Warehouse business, which is influenced less by speculative considerations than is mill activity, has declined less than usual for this time of the year, suggesting that steel consumption is holding its ground.

Scrap

Small purchases of heavy melting steel by two mills at $10 indicate that the market has lost no further ground. Covering purchases against these tonnages, as well as against old orders, have also revealed a stationary price situation. However, the whole list is so inactive that present prices are more or less nominal.

Railroad Equipment

Interstate Commerce Commission has approved application of Baltimore & Ohio for a PWA loan of $900,000 for purchase of a Diesel electric engine, two combination mail and baggage cars, six reclining-seat passengar cars, two combination dining and lunch cars, four chair cars and two observation chair cars.

Production Declines 14 Per Cent at Cleveland

Mills Will Be Able to Ship Greater Part of Second Quarter Tonnage This Week — Pipe More Active

CLEVELAND, June 26.—With all specifications against second quarter contracts for finished steel now on mill books and much of the steel already shipped, operations have turned downward. Ingot output in the Cleveland-Lorain territory has been reduced nine points to 54 per cent of capacity, a decline of 14 per cent from a week ago. Two plants expect to maintain their recent operations through this week.

Producers continued to accept releases through Monday for some products, although orders during the week were small with the exception of a good tonnage in sheets placed by the local automobile plant. Mills will be able to ship practically all the steel released for June delivery. However, some are badly crowded with sheet tonnage and have taken some business on which the advanced prices are to apply should they be unable to make shipment this week.

A late rush in pipe orders cleaned out the stocks of some producers and one mill has more pipe business on order than it expects to be able to ship by June 30. Cancellation of second quarter tonnage will amount to 15 to 20 per cent of the total on the books of some of the mills. Overcontracting appears to have been in larger volume for merchant and alloy bars, structural shapes and billets than for other products. Many alloy bar consumers prefer to pay the $2 a ton higher price later rather than put steel in stock that they are not sure of needing.

Pig Iron

Producers have stopped accepting orders against second quarter contracts and some will have difficulty in making all shipments before July 1. June shipments by a leading producer will be 80 per cent higher than during last December when a similar situation prevailed in that buyers who did not issue releases lost their equity in contract tonnage placed at $1 a ton or more lower than the price that prevailed for the first quarter. June shipments will equal the combined shipments during April and May and will exceed any previous month back to at least 1930. Producers look for little new buying before Aug. 15.

Sheets

Some belated orders in hot-rolled sheets against contracts came out during the week for shipment by June 30, but mill books are now closed. The Fisher Body Co. placed a round tonnage for its Cleveland plant succeeding, by shopping around among producers, in finding several mills that could take on some additional tonnage this month. In a few cases consumers have placed orders with the provision that should the mill be unable to make shipments this month deliveries will be made in July at the advanced prices. Some of the refrigerator manufacturers who have maintained heavy production for several months will reduce their schedules in July. The washing machine industry is also slowing down. To meet complaints of consumers that the deadline date for specifications is too far advanced some of the mills have revised their form of contract for the third quarter to allow consumers to specify on July 1 and Aug. 1 for sheets for delivery in those months instead of on the fifteenth of the month previous to the month of shipment. For September delivery the specification date is unchanged at Aug. 15. However, deadline dates are quite commonly ignored if mills can still take tonnage for the desired deliveries.

Strip Steel

Specifications were light the past week, consumers generally having previously issued releases for all the tonnage they will take against second quarter contracts. Most mills have on order all the cold-rolled strip they can produce by the end of the week.

Bolts, Nuts and Rivets

The present 70 per cent discount on bolts and nuts has been reaffirmed for the third quarter. In the absence of any price control, the code for the industry not yet having been approved, considerable price shading has appeared recently, which is claimed to have been confined to the jobbing trade. It is expected, however, that the regular discount will be maintained hereafter. Business declined about 25 per cent in June as compared with May. Rivet specifications stimulated by the $5 a ton price advance, which becomes effective on third quarter contracts, have been heavy the past week or two.

Bars, Plates and Shapes

Inquiry in the structural field has subsided and little work is pending in this territory. In Detroit the continuous sheet mill building for the Ford Motor Co. will take 1400 tons of structural steel. For a Columbus building, 200 tons was placed, and the general contract for the Columbus sewer requiring 3000 tons of reinforcing bars has been awarded. Few new specifications against contracts came out during the week.

Old Material

The market has a firmer tone and the refusal of dealers to sell at the recent low prices has resulted in a 25c. a ton advance on leading steel making and blast furnace grades. While the market price to consumers is untested, dealers are buying No. 1 heavy melting steel for yard stocks at prices that would be equivalent to $9.50 to $10 delivered mill or about $1 a ton more than they were offering two weeks ago. Blast furnace scrap is bringing a 25c. a ton advance for mill delivery and dealers are offering $7.50 for these grades for yard stocks.

Scrap Prices Higher In New England

BOSTON, June 26.—Prices for most grades of scrap average 25c. a ton higher. The advance is purely sympathetic following increases in the Middle West, and has failed to stimulate business to any appreciable extent. One sale of chemical borings is reported at as high as $9 a ton, but that price is rather exceptional, $8.25 to $8.50 a ton being the prevailing quotation. Brokers are paying $5.25 ton, f.o.b., for No. 2 steel on old orders placed by the American Steel & Wire Co., Worcester, Mass. Small tonnages of steel turnings, No. 1 steel and skeleton for Pennsylvania delivery were moved the past week, mostly distress material. Otherwise business is very largely confined to pick-up lots for storage in yards.

The pig iron market is drifting with weekly turnovers amounting to but a few hundred tons. Based on the current rate of operation, foundries apparently have sufficient iron for the next month or two. Few of them are displaying any interest whatever in future requirements. Second quarter contracts, with few exceptions, have been filled.

Cast iron pipe has been advanced $2 a ton. The local delivered price is now $47.50 a ton. Current business is confined to small tonnages.

Large Structural Projects In Prospect at New York

PWA Jobs to Come Out During Summer Are Expected to Support Dull Market—Miscellaneous Steel Business Very Quiet

NEW YORK, June 26.—With specifications against second quarter contracts now virtually completed, the burden of activity has been shifted to mills and strenuous efforts are being made to complete shipments by the end of the week. Local sales offices are experiencing the first quiet period in many weeks, and attention is being focused on prospects for the next two months. While opinions differ sharply as to the extent of the expected summer reaction, it is generally believed that the decline in steel production, which is beginning in earnest this week, will be rather severe.

In this district the most encouraging prospect is offered by large structural steel jobs which seem likely to come out in the near future. Bids will be asked early next week on three pier sheds on the North River which will require 8100 tons of structural shapes and plates. Within the next month plans will be ready for the completion of the new municipal subway for which the PWA has advanced $23,000,000. Although this work may not involve large structural tonnages, considerable steel will be required for station construction, track work and other jobs. A post office in the Bronx and the Civil Courts Building in Manhattan will also involve large steel tonnages, although plans may not be definitely made public for some time.

Solicitation of third quarter tonnage has not been carried on very actively in this district and little business has been booked. Mills point out, however, that many steel consumers will find it more convenient to place their business in the usual way in order to avoid decisions as to sources of supply at the last minute. At the same time it is indicated that competition for business may be much keener than in the past, as buyers who are not under contract may distribute their tonnage to anyone they desire whenever needs arise. The matters of delivery and of service generally will be stressed and prompt shipments will be desired.

Demand for pipe has held up relatively well in the last week, both oil companies and public utilities having been active buyers. Tin plate is very quiet and with sheet and strip mills entirely filled up for this week, orders for July delivery have been negligible.

Pig Iron

Sellers are now closing the quarter's business and bookings for third quarter continue to be very light throughout the entire trade. This condition was expected by all operators and is a natural sequence to heavy June deliveries and recent code regulations which discourage forward contracting. Most foundries will naturally reduce operations during the hot months of July and August and selling will probably be spotty and light in volume until September. In fact many melters are covered further ahead than the trade had expected and a few large users believe no more purchases will be necessary for the remainder of the year. About 1200 tons of iron of all grades for both prompt and future delivery were sold last week, as compared with 350 tons in the preceding period and 950 tons two weeks earlier. A New England user is reported to have bought 8000 tons of foreign iron at a slight price concession.

Reinforcing Steel

Demand from the building trade is slack but some tonnage is flowing into highway construction. Pending projects are lighter although a considerable volume of Federal-financed material will probably be used within two months. The American Steel & Wire Co. will furnish 345 tons of mesh for highway work in Suffolk and Seneca Counties, N. Y., and 100 tons for similar work for Connecticut. New Jersey is taking bids until July 9 on additional highway projects and a crossing elimination at Hunterdon.

Scrap

Higher prices for important grades are in effect in Western selling markets, but the better feeling here has not yet materially lifted quotations. Most mills wish to rebuild inventories after July 1 and are consequently inquiring for supplies. However, yard men are not disposed to meet present brokers' bids and the general sentiment is that prices must rise before any appreciable flow of scrap will occur. No. 2 steel is particularly active in Jersey City at $7 a ton on rail for general eastern Pennsylvania delivery. In addition, recent sales at Pittsburgh and Conshohocken, Pa., have established short shoveling and machine shop turnings at $2.50 to $3 a ton. Other grades continue to be quiet. Very little new export business is in the market as foreign buyers are still looking for bargains. Old contracts call for moderate shipments through August although some delay may result from the present scarcity of boats.

Shipping Strike Ties Up Coast Business

SAN FRANCISCO, June 25.—Federal action to terminate the six weeks' old marine strike on the Coast is foreseen in the plea of Secretary of Labor Perkins for arbitration. The longshoremen, joined by five other unions, have refused all peace plans that have been advanced. The heavy losses to business have been felt by the steel industry as many companies are withholding contracts or refusing ship delivery. Although the Los Angeles port is open, shipping at other ports is at a standstill. Approximately 105 ships, loaded with 450,000 tons of freight, are anchored in San Francisco Bay. Continuance of the strike means tremendous losses to general business.

Mills are operating at capacity on all classes of steel in an effort to fill contracts before the close of the quarter. The price schedule, filed at the opening of the second quarter, has been refiled and all sales at the start of the third quarter will be at the higher price level. With few new inquiries the backlog for the coming quarter is small and production is expected to drop.

With the opening of bids for the Grand Coulee dam, to be constructed north of Almira, Wash., the combination of Silas Mason Co., Inc., Atkinson-Kier Co., and Walsh Construction Co., was announced as low bidder at $29,339,301. This project, surpassing even the Boulder dam, will require approximately 20,000 tone of sheet piling, 5560 tons of structural steel, 12,500 tons of reinforcing bars and 4649 tons of plates in the construction of the low level dam and power plant. Steel awards are expected shortly after the award of the general contract.

Awards for the week were for minor tonnages. Columbia Steel Co. is reported as low bidder on 1600 tons of structural steel for Deception and Canoe Passes bridges in Washington. San Francisco will take bids July 6 on a pipe line which specifies approximately 1000 tons of plates.

Steel Output Sustained In Philadelphia District

Only Slight Recession in Prospect As Month Ends — Pennsylvania Railroad Places 5000 Tons for Third Quarter Requirements

PHILADELPHIA, June 26.—With all but possibly a few minor specifications in, mills are hurrying shipments on second quarter contracts against the deadline, June 30. One nearby plant today started two structural mills, one going on a double turn. Makers of sheets, tin plate, nails and wire are especially rushed, operating at capacity, but on heavy rolled products the pressure is not so great. Meanwhile open-hearth output remains at about 47 per cent of capacity, and, while there will be a substantial let down in mill orders next week with the advent of the third quarter, steelmaking operations will not be so sharply cut as had been expected. Present plans call for the taking off of only two open-hearth furnaces at the end of the present week. Operations of other active units for the purpose of piling cold steel will be continued for a short time.

The trade looks for a comparatively dull market throughout July and probably for the greater part of August, which would be entirely seasonal. After that period a pickup is expected to develop, more from miscellaneous than individual consuming demand. There has been but little third quarter contracting and while stocks of finished steel in the hands of consumers are reported not to be heavy it is believed they will cover most requirements as far as they can be anticipated for four or five weeks. There has been heavier stocking of semi-finished steel and pig iron than of the finished lines.

The Pennsylvania Railroad has distributed to a number of mills about 5000 tons of plates, bars, sheets and shapes to cover miscellaneous needs for the third quarter.

Pig Iron

Movement of pig iron continues to go forward in good volume from some furnaces, while others report that shipments have tapered off and are light. Orders in June reflected a substantial increase over those for May. There has been a great deal of iron stocked by melters and producers do not look for sizable bookings again for two months. Consumption the past week showed a light increase.

Bars, Plates and Shapes

The Pennsylvania Railroad distributed awards for its third quarter requirements of about 5000 tons of bars, plates, shapes and sheets very widely. Plate makers reported that June business was the largest for any month this year. The chief buyers were the railroads, tank builders and boiler makers. Steel bar tonnage also reached a good volume. Among the larger buyers were the railroads, warehouses and wire drawing interests. Shape business was only moderate because of the small amount of construction work. The Bureau of Yards and Docks, Navy Department, Washington, will receive bids July 11 for a building for bachelors' quarters at Quantico, Va., to cost $180,000. A large tonnage of structural material will be required for the aircraft plant to be built at the Philadelphia Navy Yard. It is estimated that about 500 tons will be required for a junior high school at Reading, Pa., for which the Reading School District will take bids July 6.

Sheets

Sheet mills are operating at capacity on both commercial and full-finished lines and are rushing shipments for delivery before expiration of the second quarter next Saturday. While there has been some stocking, mill interests do not think it has been heavy and feel that the greater part of the tonnage is going into immediate consumption. There is expected to be a substantial drop in demand beginning with the third quarter as indicated by schedules of automotive body and car builders. However, it is believed that after a brief lag the demand for automobiles will pick up, partly as the result of reduced prices car makers have put into effect. Demand from both radio and stove makers is fair.

Scrap

With the steel trade seeing the end of its second quarter rush, the scrap market shows a slightly easier tone and demand is quiet. The general tone, however, is rather firm, though affected by easing off in demand in both the domestic and foreign markets. The latter market has let down partly on account of credit conditions and restrictions on foreign exchange. Heavy breakable cast has settled down to a level of $10.50 at which sales have been made the past week, while specification pipe is easier at $8.50 to $9.

Imports

The following iron and steel imports were received here last week: 1135 tons of pig iron from British India and 75 tons of ferromanganese from Poland.

Third Quarter Sheet Tonnage at Cincinnati

CINCINNATI, June 26.—The steady sheet demand for third quarter and the absence of price pressure have removed the undercurrent of nervousness in this district. In fact, the leading interest reports bookings for July shipment equal to about 35 per cent of capacity output with orders still coming in. The largest factor in July commitments so far is automotive purchasing. Based on present bookings, indications are that no drastic stoppage in business activity is likely, at least during the first part of the third quarter. Consumers display a definite desire to cover for needs, buying material desired without question of price. At present buyers show more interest in the assurance of delivery than in trying to save money on orders.

Pig Iron

The rush of melters to take all iron on order before June 30 has resulted in heavier shipments this month than during April and May together. Current bookings are negligible and show foundry conservatism toward new commitments.

Coke

Renewal of foundry coke contracts for another 30 days constitutes the bulk of new activity. Shipments are relatively unchanged.

Warehouse Business

Jobbers' business has been well sustained this month, the usual seasonal tapering having been absent. Industrial demand constitutes the bulk of current business.

Scrap

With mills carrying adequate supplies for current operations, demand for scrap is lacking. Tonnage contracts are nearing completion but mills refuse to anticipate needs until their third quarter business is discernible.

Marshall Probable Steel Labor Board Head

DEFINITE plans to settle the threatened steel strike situation are expected to be worked out before President Roosevelt leaves Washington next Saturday on his trip to Hawaii. While negotiations for the Government have been left to Secretary of Labor Frances Perkins by the President, it is said that if an agreement has not been reached before he departs negotiations will be started at once under a mediation board or boards to be set up under the compromise Wagner Labor Disputes resolution.

General Hugh S. Johnson, NRA Administrator, today said that at a conference yesterday between Miss Perkins, himself, Donald Richberg, NRA general counsel, and Senator Wagner, a general plan for the creation of a new labor board had been agreed upon. He said it remained to be passed upon by the President before whom it will be laid by Miss Perkins. The plan, according to General Johnson, calls for a recasting of the present National Labor Board and setting up of new machinery under the Wagner resolution. He stated that while he could not give out details, a different board could be established for handling labor disputes in different industries.

It is not known how much progress has been made to settle the controversy between the Amalgamated Association of Iron, Steel and Tin Workers and the steel industry. Miss Perkins last week sent to the American Iron and Steel Institute the plan proposed by the association at the recent Pittsburgh convention. Whether or not a reply had been received from the institute has not been revealed. In the event agreement is not reached through this means it is understood to be the plan to begin mediation efforts through a board. The board to inquire into the steel situation, if set up, is expected to be headed by Dr. Leon C. Marshall, vice-chairman of the National Labor Board, and formerly a member of the Institute of Law, Johns Hopkins University, Baltimore.

Miss Perkins also has promised to send to the American Iron and Steel Institute an eleven point plan presented to her yesterday by the radical group known as the Sheet and Metal Workers' Industrial Union, headed by Patrick Kush. This plan, however, is not expected to receive any serious attention at the hands of the industry because of its extravagant demands.

Unemployment in May Was 7,899,000

THE total number of unemployed workers in May, 1934, was 7,899,000, according to an estimate of the National Industrial Conference Board issued June 27. This is a decline of 50,000 or 0.6 per cent from the April, 1934, total and a decline of 5,304,000 or 40.2 per cent from the total in March, 1933, when unemployment was at its highest point.

A slowing down in the rate of decrease of unemployment is evidenced in a comparison of the May decrease of 50,000 with the April decrease of 72,000, and the March decrease of 589,000.

Although all industrial groups combined showed a decrease from April to May, unemployment in two groups increased as follows: Manufacturing and mechanical, 10,000; and domestic and personal service, 12,000. These increases were overcome by decreases in other groups as follows: extraction of minerals, 32,000; transportation, 18,000; trade, 48,000; and miscellaneous occupations, 2000. In addition it is estimated that 27,000 new workers became available for employment during the month.

	Number of Unemployed			
Industrial Group	March, 1933	March, 1934	April, 1934	May, 1934
Extraction of minerals	576,000	459,000	491,000	459,000
Manufacturing and mechanical	6,423,000	2,599,000	2,534,000 [1]	2,544,000
Transportation	1,591,000	1,422,000	1,422,000 [1]	1,404,000
Trade	2,126,000	1,020,000	961,000	913,000
Domestic and personal service	607,000	432,000	427,000	439,000
Industry not specified	539,000	420,000	418,000 [1]	416,000
Other industries [2]	296,000	296,000	296,000	294,000
All industries	12,158,000	6,647,000	6,548,000 [1]	6,471,000
Allowance for new workers since 1930 Census	1,045,000	1,374,000	1,401,000	1,428,000
Total unemployed	13,203,000	8,021,000	7,949,000 [1]	7,899,000

[1] Revised.

[2] This group includes agriculture, forestry and fishing, public service and professional service. The number given is that of the unemployed in 1930, no figures being available from which later changes in employment can be computed.

Since March, 1933, the most marked decreases have been shown in the manufacturing and mechanical group. The number of unemployed in this group in May, 1934, was 2,544,000, a decline of 3,879,000, or 60.4 per cent, from the peak of unemployment in this group in March, 1933. From March, 1933, to May, 1934, the number of unemployed workers decreased 57.1 per cent in trade; 27.7 per cent in domestic and personal service; 20.3 per cent in the extraction of minerals; and 11.8 per cent in transportation.

In this estimate the workers employed through the Public Works Administration are counted as employed. Emergency workers employed under Government auspices, usually part time, in lieu of direct unemployment relief are counted as unemployed.

The accompanying table shows the number of unemployed workers in the various industrial groups in March, 1933; March, 1934; April, 1934, and May, 1934.

Buffalo Steel Output Drops Off Sharply

BUFFALO, June 26. — While shipments of pig iron have picked up in volume, it is probable that some of the iron contracted to be shipped during the second quarter will not be specified and for that reason will have to be cancelled as of June 30. Furnace operations are unchanged but sales during the past week were much lighter.

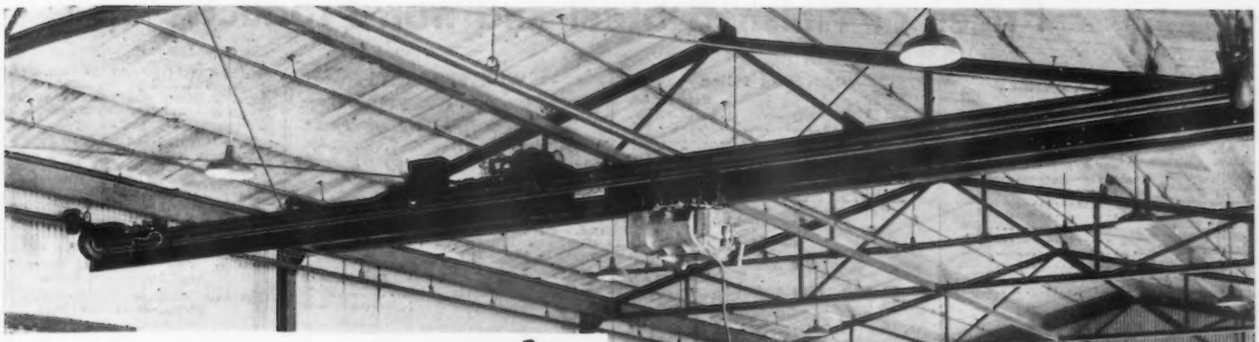
Finished Steel

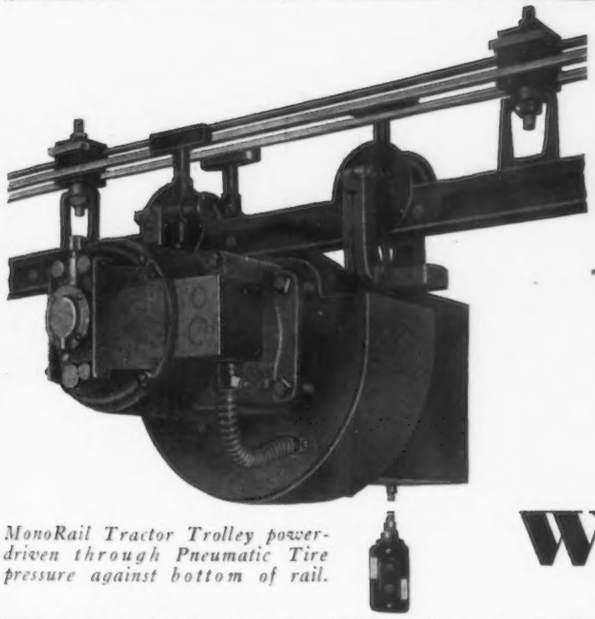
Reinforcing bars for a filtration plant at Niagara Falls, N. Y., amounting to 300 tons, are of interest to bar makers at this time. One of the bridges from Tonawanda to Grand Island will require 150 tons of bars.

The Lackawanna plant of the Bethlehem Steel Corpn. has dropped its operations to 12 furnaces; Republic Steel Corpn. has four furnaces active and Seneca sheet division of Bethlehem is operating at 90 per cent. Wickwire-Spencer Corpn. is operating one open-hearth on full time and the other on part time.

Scrap

Little activity characterizes the scrap market. Only minor transactions have taken place. Some consumers who have been taking no shipments are now receiving a few cars a week. Cheap scrap is hard to find, dealers being of the opinion that a rise in prices shortly will justify their holding stocks. All prices quoted in the list are nominal.





MonoRail Tractor Trolley power-driven through Pneumatic Tire pressure against bottom of rail.

One-ton capacity, 36-ft. span Crane with Pneumatic Tire Drive traction through rubber to steel contact on bottom of rail runways.

IT'S *NEW* Will It Help You?

DRIVING MonoRail Carriers and Cranes through a wheel equipped with pneumatic tire and tube to give traction through pressure against the undersurface of the rail is such a logical and natural development, the wonder is it wasn't done long ago.

While we announce it as new, it is away beyond the experimental stage. Carrier and Crane installations, covering a wide range of applications and with unusual control features, have been delivering topnotch performance on some exacting jobs for more than a year.

Many Advantages Over Conventional Steel to Steel Types

1. Wear on wheels and track due to slippage is entirely eliminated.
2. The unit will handle loads on heavy grades under perfect control up and down.
3. In combination with electric hoists both vertical and horizontal movement of loads controlled from single push button box—pendant cord, cab or remote control.
4. Has greater drawbar pull, and it is not necessary to weight the tractor unit to secure traction.
5. Can be applied to any present Carrier and Crane installation operating on a rail with smooth undersurface.
6. Available in all current characteristics and with controls as required.

Complete MonoRail Systems—Hand or Electric

American MonoRail engineers have assisted in working out many difficult material handling problems in both manually and electrically operated fields.

With an Eastern and a Western Branch and representatives in all principal centers, these experienced men are immediately available for preliminary engineering and price information.

However large or small the proposition may be, American MonoRail Tracks, Carriers, Cranes, Hoists and Pick-Up Devices will in most cases meet the requirements.

We solicit your inquiries

The AMERICAN MONORAIL Company

13107 ATHENS AVE., CLEVELAND, OHIO

Prices of Finished Steel and Iron Products

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel *Base per Lb.*

F.o.b. Pittsburgh .....1.90c.
F.o.b. Chicago .....1.95c.
F.o.b. Gary .....1.95c.
F.o.b. Duluth .....2.10c.
Del'd Detroit .....2.05c.
F.o.b. Cleveland .....1.95c.
F.o.b. Buffalo .....2.00c.
Del'd Philadelphia .....2.19c.
Del'd New York 2.23c
F.o.b. Birmingham .....2.05c.
F.o.b. cars dock Gulf ports .....2.30c.
F.o.b. cars dock Pacific ports.....2.45c.

Rail Steel

(For merchant trade)

F.o.b. Pittsburgh .....1.80c.
F.o.b. Chicago .....1.85c.
F.o.b. Gary .....1.85c.
F.o.b. Moline, Ill. .....1.85c.
F.o.b. Cleveland .....1.85c.
F.o.b. Buffalo .....1.90c.
F.o.b. Birmingham .....1.95c.
F.o.b. cars dock Gulf ports.....2.20c.
F.o.b. cars dock Pacific ports.....2.35c.

Billet Steel Reinforcing

(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh .....2.05c.
F.o.b. Chicago .....2.10c.
F.o.b. Gary .....2.10c.
Del'd Detroit .....2.20c.
F.o.b. Cleveland .....2.10c.
F.o.b. Youngstown .....2.10c.
F.o.b. Buffalo .....2.10c.
F.o.b. Birmingham .....2.10c.
F.o.b. cars dock Gulf ports.....2.45c.
F.o.b. cars dock Pacific ports.....2.60c.

Rail Steel Reinforcing

(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh .....1.90c.
F.o.b. Chicago .....1.95c.
F.o.b. Gary .....1.95c.
F.o.b. Cleveland .....1.95c.
F.o.b. Youngstown .....1.95c.
F.o.b. Buffalo .....1.95c.
F.o.b. Birmingham .....1.95c.
F.o.b. cars dock Gulf ports.....2.30c.
F.o.b. cars dock Pacific ports.....2.45c.

Iron

F.o.b. Chicago .....1.90c.
F.o.b. Terre Haute, Ind. .....1.85c.
F.o.b. Reading, Pa. .....
F.o.b. Danville, Pa. .....
F.o.b. Berwick, Pa. .....

Cold Finished Bars and Shafting*

Base per Lb.

F.o.b. Pittsburgh .....2.10c.
F.o.b. Chicago .....2.15c.
F.o.b. Gary .....2.15c.
F.o.b. Cleveland .....2.15c.
F.o.b. Buffalo .....2.20c.
Del'd Detroit .....2.30c.
Del'd eastern Michigan .....2.35c.

* *In quantities of 10,000 to 19,999 lb.*

Fence and Sign Posts

Angle Line Posts

Base per Net Ton

F.o.b. Pittsburgh $50.00
F.o.b. Chicago 50.00
F.o.b. Duluth 51.00
F.o.b. Cleveland 50.00
F.o.b. Birmingham 53.00
F.o.b. Houston 59.00
F.o.b. cars dock Pacific ports..... 67.00

Plates

Base per Lb.

F.o.b. Pittsburgh .....1.85c.
F.o.b. Chicago .....1.90c.
F.o.b. Gary .....1.90c.
Del'd Cleveland .....2.035c.
F.o.b. Coatesville .....1.95c.
F.o.b. Sparrows Points .....1.95c.
Del'd Philadelphia .....2.035c.
Del'd New York .....2.13c.
F.o.b. Birmingham .....2.00c.
F.o.b. cars dock Gulf ports .....2.25c.
F.o.b. cars dock Pacific ports.....2.40c.
Wrought iron plates, f.o.b. P'gh...3.00c.

Floor Plates

F.o.b. Pittsburgh .....3.35c.
F.o.b. Chicago .....3.40c.
F.o.b. Coatesville .....3.45c.
F.o.b. cars dock Gulf ports.....3.75c.
F.o.b. cars dock Pacific ports.....3.90c.

Structural Shapes

Base per Lb.

F.o.b. Pittsburgh .....1.85c.
F.o.b. Chicago .....1.90c.
Del'd Cleveland .....2.035c.
F.o.b. Buffalo .....1.95c.
F.o.b. Bethlehem .....1.95c.
Del'd Philadelphia .....2.055c.
Del'd New York .....2.1025c.
F.o.b. Birmingham (standard).....2.00c.
F.o.b. cars dock, Gulf ports .....2.25c.
F.o.b. cars dock Pacific ports.....2.40c.

Steel Sheet Piling

Base per Lb.

F.o.b. Pittsburgh .....2.15c.
F.o.b. Chicago .....2.25c.
F.o.b. Buffalo .....2.25c.
F.o.b. cars dock Gulf ports .....2.60c.
F.o.b. cars dock Pacific ports.....2.60c.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

Base per Lb.

No. 10, f.o.b. Pittsburgh .....2.00c.
No. 10, f.o.b. Gary .....2.10c.
No. 10, del'd Detroit .....2.20c.
No. 10, del'd Phila .....2.29c.
No. 10, f.o.b. Birmingham .....2.15c.
No. 10, f.o.b. dock cars Pacific ports .....2.55c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh.....2.65c.
No. 24, f.o.b. Gary .....2.75c.
No. 24, del'd Detroit .....2.85c.
No. 24, del'd Phila. .....2.94c.
No. 24, f.o.b. Birmingham .....2.80c.
No. 24, f.o.b. dock cars Pacific ports .....3.25c.
No. 24, wrought iron, Pittsburgh....4.30c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh .....2.55c.
No. 10 gage, f.o.b. Gary .....2.65c.
No. 10 gage, del'd Detroit .....2.75c.
No. 10 gage, del'd Phila. .....2.84c.
No. 10 gage, f.o.b. Birmingham.....2.70c.
No. 10 gage, f.o.b. dock cars Pacific ports .....3.15c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh .....3.15c.
No. 20 gage, f.o.b. Gary .....3.25c.
No. 20 gage, del'd Detroit .....3.35c.
No. 20 gage, del'd Phila. .....3.44c.
No. 20 gage, f.o.b. Birmingham .....3.30c.
No. 20 gage, f.o.b. dock cars Pacific ports .....3.70c.

Galvanized Sheets

No. 24, f.o.b. Pittsburgh.....3.25c.
No. 24, f.o.b. Gary .....3.35c.
No. 24, del'd Phila. .....3.54c.
No. 24, f.o.b. Birmingham .....3.40c.
No. 24, f.o.b. dock cars Pacific ports .....3.85c.
No. 24, wrought iron, Pittsburgh....4.95c.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh .....3.65c.
F.o.b. cars dock Pacific ports.....4.35c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh .....3.20c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh .....2.85c.
No. 28, Gary .....2.95c.
No. 28, cars dock, Pacific Coast ports .....3.35c.

Tin Plate *Base per Box*

Standard cokes, f.o.b. P'gh district mill $5.25
Standard cokes, f.o.b. Gary..... 5.35
Standard cokes, f.o.b. cars dock Pacific ports 5.90

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.....$10.00
15-lb. coating I.C..... 12.00
20-lb. coating I.C..... 13.00
25-lb. coating I.C..... 14.00
30-lb. coating I.C..... 15.25
40-lb. coating I.C..... 17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

Base per Lb.

All widths up to 24 in., P'gh.....2.00c.
All widths up to 24 in., Chicago....2.10c.
All widths up to 24 in., del'd Detroit .....2.20c.
All widths up to 24 in., Birmingham.2.15c.
Cooperage stock, Pittsburgh.....2.10c.
Cooperage stock, Chicago .....2.20c.

Cold-Rolled Strips

Base per Lb.

F.o.b. Pittsburgh .....2.80c.
F.o.b. Cleveland .....2.80c.
Del'd Chicago .....3.08c.
F.o.b. Worcester .....3.00c.

Fender Stock

No. 16 and heavier, Pittsburgh or Cleveland .....3.20c.
F.o.b. Worcester .....3.60c.
No. 17 and lighter, Pittsburgh or Cleveland .....3.50c.
F.o.b. Worcester .....3.90c.

Hot-Rolled Rail Steel Strips

Base per Lb.

F.o.b. Pittsburgh.....1.80c.
F.o.b. Chicago .....1.85c.
F.o.b. Birmingham .....1.95c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade Per Lb.

Bright wire .....2.30c.
Spring wire .....3.20c.

To Jobbing Trade

Qualified jobbers are entitled to a reduction of 20c. a 100 lb. from the base price on carload shipments to stock, and of 10c. a 100 lb. on less-carload shipments to stock.

Base per Keg

Standard wire nails $2.60
Smooth coated nails 2.60
Galvanized nails:
15 gage and coarser 4.60
16 gage and finer 5.10

Base per 100 Lb.

Annealed fence wire $2.45
Galvanized fence wire 2.80
Polished staples 3.30
Galvanized staples 3.55
Barbed wire, galvanized 3.00
Woven wire fence, base column..... 63.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

On manufacturers' wire prices at Pacific ports are $9 above the Pittsburgh base. On high-carbon spring wire, prices at Pacific ports are also $9 above Pittsburgh. On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi are $6 a ton over Pittsburgh, while New Orleans and Pacific Coast prices are $8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are $11 a ton above Pittsburgh.

Wire Hoops, Twisted or Welded

Off List

F.o.b. Pittsburgh .....35 and 2½ off
F.o.b. Chicago .....35 off

Bale Ties, Single Loop

Base per Net Ton

F.o.b. Pittsburgh $63.00
F.o.b. Chicago 64.00
F.o.b. Duluth 65.00
F.o.b. Cleveland 63.00
F.o.b. Birmingham 66.00
F.o.b. cars dock Houston, Galveston, Beaumont, Orange or Corpus Christi, Tex. 72.00
F.o.b. cars dock Pacific ports..... 74.00

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Inches	Steel Black	Steel Galv.	Wrought Iron Black	Wrought Iron Galv.
⅛	.....51½	29½	⅛ ..+91⅛	+138
¼ to ⅜	..53½	35	¼ & ⅜	+1½ +21½
½	.....58½	47	½	....31½ 15
¾	62	52	¾	....36½ 20½
1 to 3	64	55	1 & 1¼	. 39½ 25½
			1½	...43½ 28
			2	.....41½ 26

Lap Weld

2	60	51	2	 37	22½
2½ to 3	..63	54	2½ to 3½	38	25
3½ to 6	..65	56	4 to 8	... 40	28½
7 and 8	..64	54	9 to 12	..38	24½
9 and 10	..63½	53½			
11 and 12	.62½	52½			

Butt Weld, extra strong, plain ends

⅛	.....48½	33½	⅛	....+13	+45½
¼ to ⅜	..51	38	¼ & ⅜	+2½	+34½
½	.....56½	47½	½	.....32½	17½
¾	61	52	¾	.....37½	22½
1 to 3	63	55	1 to 2	..43½	29

Lap Weld, extra strong, plain ends

2	58	50	2	 40	26
2½ to 3	..62	54	2½ to 4	45½	33
3½ to 6	..65½	57½	4½ to 6	45	33½
7 and 8	...64½	54½	7 & 8	.. 46	32
9 and 10	..63½	53½	9 to 12	.41½	30
11 and 12	.62½	52½			

On standard steel pipe an extra 5% off is allowed on sales to consumers while two 5's off apply on sales to jobbers. On less-than-carload shipments prices are determined by adding 20 and 25% and the carload freight rate to the base card. On structural steel pipe the base card is reduced 2 points and two 5's off are allowed to consumers and three 5's off to jobbers.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 8.60	....
1¼ in. o.d.	13 B.W.G.	10.19	....
1½ in. o.d.	13 B.W.G.	11.26	....
1¾ in. o.d.	13 B.W.G.	12.81	....
2 in. o.d.	13 B.W.G.	14.35	$13.04
2¼ in. o.d.	13 B.W.G.	16.00	14.54
2½ in. o.d.	12 B.W.G.	19.29	17.54
2¾ in. o.d.	12 B.W.G.	20.45	18.59
3 in. o.d.	12 B.W.G.	21.45	19.50
3¼ in. o.d.	11 B.W.G.	25.22	22.93
3½ in. o.d.	11 B.W.G.	27.09	24.63
4 in. o.d.	10 B.W.G.	33.60	30.54
4½ in. o.d.	10 B.W.G.	41.08	37.35
5 in. o.d.	9 B.W.G.	51.56	46.87
6 in. o.d.	7 B.W.G.	79.15	71.96

Extras for less-carload quantities:
25,000 lb. or ft. to 39,999 lb. or ft. 5 %
10,000 lb. or ft. to 24,999 lb. or ft. 12½ %
2,000 lb. or ft. to 9,999 lb. or ft. 25 %
Under 2,000 lb. or ft. .....40 %

Hot-Finished Lapweld Steel Pressure Tubes

(Net base prices per 100 ft., f.o.b. Pittsburgh, in carload lots)

1½ in. o.d.	13 B.W.G.	$ 9.72
1¾ in. o.d.	13 B.W.G.	11.06
2 in. o.d.	13 B.W.G.	12.38
2¼ in. o.d.	13 B.W.G.	13.79
2½ in. o.d.	12 B.W.G.	16.58
2¾ in. o.d.	12 B.W.G.	17.54
3 in. o.d.	12 B.W.G.	18.35
3¼ in. o.d.	11 B.W.G.	21.56
3½ in. o.d.	11 B.W.G.	23.15
4 in. o.d.	10 B.W.G.	28.68
4½ in. o.d.	10 B.W.G.	35.22
5 in. o.d.	9 B.W.G.	44.25
6 in. o.d.	7 B.W.G.	68.14

Quantity Extras:
40,000 lb. or ft. .....base
25,000 lb. or ft. to 39,999 lb. or ft. .....plus 5 %
10,000 lb. or ft. to 24,999 lb. or ft. .....plus 12½ %
2,000 lb. or ft. to 9,999 lb. or ft. .....plus 25 %
Under 2,000 lb. or ft. .....plus 40 %

CAST IRON WATER PIPE

Per Net Ton

6-in. and larger, del'd Chicago $47.00
4-in., del'd Chicago 50.00
6-in. and larger, del'd New York... 45.00
4-in. del'd New York 48.00
6-in., and larger, Birmingham..... 39.00
4-in. Birmingham 42.00

Class "A" and gas pipe, $3 extra

RAILROAD MATERIALS

Rails and Track Supplies

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton $36.37½
Angle bars, per 100 lb. 2.55

F.o.b. Code Basing Points

Light rails (from billets) per gross ton $35.00
Light rails (from rail steel) per gross ton 34.00

Base per 100 Lb.

Spikes, 9/16 in. and larger $2.40
Spikes, ½ in. and smaller 2.40
Spikes, boat and barge 2.40
Tie plates, steel 1.90
Track bolts, to steam railroads.... 3.55
Track bolts, no jobbers, all sizes (per 100 count) .....70 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Buffalo, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa.; on spikes alone, Cleveland, Youngstown, Lebanon, Pa., Columbia, Pa., Richmond, Va., Jersey City, N. J.

Girder Rails

Per Gross Ton

F.o.b. Lorain $47.00
F.o.b. Steelton 47.00

Splice Bars for Girder Rails

Base per 100 Lb.

F.o.b. Lorain and Steelton.....$4.30

Steel Car Axles

Base per Lb.

F.o.b. Pittsburgh .....2.65c.
F.o.b. Chicago .....2.65c.
F.o.b. Birmingham .....2.65c.

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	70
Carriage bolts	70
Lag bolts	70
Plow bolts, Nos. 1, 2, 3 and 7 heads	70
Hot-pressed nuts, blank or tapped, square	70
Hot-pressed nuts, blank or tapped, hexagons	70
C.p.c. and t. square or hex. nuts, blank or tapped	70
Semi-finished hexagon nuts	70
Semi-finished hexagon castellated nuts, S.A.E.	70
Stove bolts in packages, Pittsburgh	75
Stove bolts in packages, Chicago	75
Stove bolts in packages, Cleveland	75
Stove bolts in bulk, P'gh	83
Stove bolts in bulk, Chicago	83
Stove bolts in bulk, Cleveland	83
Tire bolts	60

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$3.00
F.o.b. Chicago	3.10
F.o.b. Birmingham	3.15

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birm'g'm	70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	75, 10 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	85
Upset set screws, cut and oval point	75 and 10
Milled studs	65

Alloy and Stainless Steel

Alloy Steel Ingots

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Uncropped .....$42 per gross ton

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $51 a gross ton.
Price del'd Detroit is $54.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base.....2.55c. a lb.
Delivered price at Detroit is 2.70c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (1½% Nickel)	$0.25
2100 (2½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x6 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.05c. base per lb.

STAINLESS STEEL No. 302

(17 to 19% Cr, 7 to 9% Ni, 0.08 to 0.20% C)

(Base Prices, f.o.b. Pittsburgh)

	Per Lb.
Bars	23c.
Plates	26c.
Sheets	32c.
Hot-rolled strip	20¾c.
Cold-rolled strip	27c.

Raw and Semi-Finished Steel

Carbon Steel Rerolling Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.
Uncropped .....$29 per gross ton

Carbon Steel Forging Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Birmingham.
Uncropped ....$31 per gross ton

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.

	Per Gross Ton
Rerolling	$29.00
Forging quality	34.00
Delivered Detroit	
Rerolling	$32.00
Forging quality	37.00
Billets Only F.o.b. Duluth	
Rerolling	$32.00
Forging	37.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$30.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved	1.70c.
Universal	1.70c.
Sheared	1.70c.

Tube Rounds

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Buffalo	2.00c.
F.o.b. Birmingham	2.05c.

Wire Rods

(Common soft, base)

	Per Gross Ton
F.o.b. Pittsburgh	$38.00
F.o.b. Cleveland	38.00
F.o.b. Chicago	39.00
F.o.b. Anderson, Ind.	39.00
F.o.b. Youngstown	39.00
F.o.b. Worcester, Mass.	40.00
F.o.b. Birmingham	41.00
F.o.b. San Francisco	47.00

Pig Iron and Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	$19.50	$20.00	$19.00	$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Steelton, Pa.	....	....	19.00	....
Sparrows Point, Md.	19.50	....	19.00	....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	[illegible].00	19.00
Buffalo	18.50	19.00	17.50	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	....
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	....
Duluth, Minn.	19.00	19.00	....	19.50
Birmingham	14.50	14.50	13.50	19.00
Provo, Utah	17.50	....	17.00	..

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District				
From Everett, Mass.	$20.00	$20.50	$19.50	$21.00
Brooklyn				
From East Pa. or Buffalo	21.77	22.27	21.27	22.77
Newark or Jersey City, N. J.				
From East. Pa. or Buffalo	20.89	21.39	20.39	21.89
Philadelphia				
From Eastern Pa.	20.26	20.76	19.76	21.26
Cincinnati				
From Hamilton, Ohio	19.51	19.51	19.01	20.01
Canton, Ohio				
From Cleveland and Youngstown	19.76	19.76	19.26	20.26
Columbus, Ohio				
From Hamilton, Ohio	20.50	20.50	....	....
Mansfield, Ohio				
From Cleveland and Toledo	20.26	20.26	....	....
Indianapolis				
From Hamilton, Ohio	20.77	20.77	....	....
South Bend, Ind.				
From Chicago	20.55	20.55	....	....
Milwaukee				
From Chicago	19.50	19.50	....	....
St. Paul				
From Duluth	20.94	....	....	....
Davenport, Iowa				
From Chicago	20.26	20.26	....	....
Kansas City				
From Granite City	21.04	21.04	....	....

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.....$23.50
Johnson City, Tenn. 19.50
Del'd Chicago 25.15

GRAY FORGE PIG IRON

Valley furnace $18.25

CHARCOAL PIG IRON

Lake Superior furnace $21.00
Delivered Chicago 24.04
Delivered Buffalo 24.28

CANADA

Pig Iron

Per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	21.00
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

	Per Gross Ton
Domestic, 80% (carload)	$85.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$26.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	136.00
14% to 16% (f.o.b.) Welland, Ont. (in carloads) (duty paid)	31.00
14% to 16% (less carloads)	38.50

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
6%	$22.75	12%	$29.25
7%	23.75	13%	30.75
8%	24.75	14%	32.25
9%	25.75	15%	33.75
10%	26.75	16%	35.25
11%	27.75	17%	36.75

Base prices at Buffalo are $1.25 higher than at Jackson except on 17 to 18% in which the Buffalo price is $1.75 a ton higher.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
10%	$27.75	14%	$33.25
11%	28.75	15%	34.75
12%	30.25	16%	36.25
13%	31.75	17%	37.75

Manganese 1¼ to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W, del., carloads	$1.40 to $1.50
Ferrotungsten, less carloads	1.55 to 1.60
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered, in carloads	10.00c.
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del., per lb. contained V	$2.70 to $2.90
Ferrocarbontitanium, 15 to 18% Ti, 6 to 8% C, f.o.b. furnace carload and contract per net ton	$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, car lots	$38.00
Ton lots or less, per ton	45.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	90.00
2% carbon grade	95.00
1% carbon grade	105.00
Spot prices	$5 a ton higher

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:		
No. 1 heavy melting steel	$11.50 to	$12.00
No. 2 heavy melting steel	10.50 to	11.00
No. 2 railroad wrought	11.50 to	12.00
Scrap rails	11.50 to	12.00
Rails 3 ft. and under	14.50 to	15.00
Compressed sheet steel	11.00 to	11.50
Hand bundled sheet steel	10.00 to	10.50
Hvy. steel axle turnings	11.00 to	11.50
Machine shop turnings	7.50 to	8.00
Short shov. turnings	7.50 to	8.00
Short mixed borings and turnings	7.00 to	7.50
Cast iron borings	7.00 to	7.50
Cast iron carwheels	11.50 to	12.00
Heavy breakable cast	10.00 to	10.50
No. 1 cast	12.00 to	12.50
Railr. knuckles and couplers	13.75 to	14.25
Rail. coil and leaf springs	13.75 to	14.25
Rolled steel wheels	13.75 to	14.25
Low phos. billet crops	15.50 to	16.00
Low phos. sheet bar crops	14.50 to	15.00
Low phos. plate scrap	13.50 to	14.00
Low phos. punchings	14.00 to	14.50
Steel car axles	14.50 to	15.00

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton	
Heavy melting steel	$9.50 to	$10.00
Automobile hvy. melt. steel	8.75 to	9.25
Shoveling steel	$9.50 to	$10.00
Hydraulic comp. sheets	8.50 to	9.00
Drop forge flashings	7.50 to	8.00
No. 1 busheling	8.00 to	8.50
Rolled carwheels	10.25 to	10.75
Railroad tires	10.25 to	10.75
Railroad leaf springs	10.25 to	10.75
Axle turnings	8.00 to	8.50
Steel couplers and knuckles	10.00 to	10.50
Coil springs	10.25 to	10.75
Axle turnings (elec. fur.)	8.50 to	9.00
Low phos. punchings	10.50 to	11.00
Low phos. plates, 12 in. and under	10.50 to	11.00
Cast iron punchings	5.00 to	5.50
Short shoveling turnings	5.00 to	5.50
Machine shop turnings	5.00 to	5.50
Rerolling rails	10.50 to	11.00
Steel rails, less than 3 ft.	10.50 to	11.00
Steel rails, less than 2 ft.	11.00 to	11.50
Angle bars, steel	10.25 to	10.75
Cast iron carwheels	9.75 to	10.25
Railroad malleable	9.75 to	10.25
Agricultural malleable	8.00 to	8.50

	Per Net Ton	
Iron car axles	$11.25 to	$11.75
Steel car axles	10.50 to	11.00
No. 1 railroad wrought	7.50 to	8.00
No. 2 railroad wrought	8.25 to	8.75
No. 2 busheling	2.75 to	3.25
Locomotive tires, smooth	8.50 to	9.00
Pipe and flues	4.00 to	4.50
No. 1 machinery cast	7.50 to	8.00
Clean automobile cast	7.50 to	8.00
No. 1 railroad cast	7.00 to	7.50
No. 1 agricultural cast	6.00 to	6.50
Stove plate	5.50 to	6.00
Grate bars	5.00 to	5.50
Brake shoes	6.50 to	7.00

PHILADELPHIA

Per gross ton delivered consumers' yards:		
No. 1 heavy melting steel	....	$10.50
No. 2 heavy melting steel	$9.00 to	9.50
No. 1 railroad wrought	12.00 to	12.50
Bundled sheets	....	9.50
Hydraulic compressed, new	....	10.00
Hydraulic compressed, old	....	7.00
Machine shop turnings	6.50 to	7.00
Heavy axle turnings	9.00 to	9.50
Cast borings	5.50 to	6.00
Heavy breakable cast	....	10.50
Stove plate (steel works)	8.00 to	8.50
No. 1 low phos. heavy	....	15.00
Couplers and knuckles	14.00 to	14.50
Rolled steel wheels	14.00 to	14.50
No. 1 blast furnace	5.50 to	6.00
Spec. iron and steel pipe	8.50 to	9.00
Shafting	15.00 to	16.00
Steel axles	....	14.50
No. 1 forge fire	9.50 to	10.00
Cast iron car wheels	11.00 to	11.50
No. 1 cast	12.00 to	12.50
Cast borings (chem.)	12.00 to	14.00
Steel rails for rolling	....	13.00

CINCINNATI

Dealers' buying prices per gross ton:		
Heavy melting steel	$7.25 to	$7.75
Scrap rails for melting	8.25 to	8.75
Loose sheet clippings	3.75 to	4.25
Bundled sheets	5.75 to	6.25
Cast iron borings	5.00 to	5.50
Machine shop turnings	4.75 to	5.25
No. 1 busheling	6.25 to	6.75
No. 2 busheling	2.75 to	3.25
Rails for rolling	8.75 to	9.25
No. 1 locomotive tires	8.50 to	9.00
Short rails	11.25 to	11.75
Cast iron carwheels	7.75 to	8.25
No. 1 machinery cast	9.00 to	9.50
No. 1 railroad cast	8.50 to	9.00
Burnt cast	6.00 to	6.50
Stove plate	6.00 to	6.50
Agricultural malleable	8.00 to	8.50
Railroad malleable	8.00 to	8.50

CLEVELAND

Per gross ton delivered consumers' yards:		
No. 1 heavy melting steel	$9.50 to	$10.00
No. 2 heavy melting steel	9.00 to	9.50
Compressed sheet steel	9.00 to	9.50
Light bundled sheet stampings	7.25 to	7.50
Drop forge flashings	8.75 to	9.25
Machine shop turnings	7.25 to	7.75
Short shoveling turnings	7.50 to	7.75
No. 1 busheling	8.75 to	9.25
Steel axle turnings	8.25 to	8.75
Low phos. billet crops	13.25 to	13.75
Cast iron borings	7.25 to	7.75
Mixed borings and short turnings	7.25 to	7.75
No. 2 busheling	7.25 to	7.75
No. 1 cast	11.50 to	11.75
Railroad grate bars	7.00 to	7.50
Stove plate	6.50 to	7.00
Rails under 3 ft.	14.50 to	15.00
Rails for rolling	16.00 to	16.50
Railroad malleable	11.50 to	12.00
Cast iron carwheels	10.75 to	11.25

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:		
No. 1 heavy melting steel	$10.50 to	$11.00
No. 2 heavy melting scrap	9.00 to	9.50
Scrap rails	10.00 to	10.50
New hydraul. comp. sheets	9.00 to	9.50
Old hydraul. comp. sheets	8.00 to	8.50
Drop forge flashings	9.00 to	9.50
No. 1 busheling	9.00 to	9.50
Hvy. steel axle turnings	7.00 to	7.50
Machine shop turnings	5.00 to	5.50
Knuckles and couplers	11.50 to	12.00
Coil and leaf springs	11.50 to	12.00
Rolled steel wheels	11.50 to	12.00
Low phos. billet crops	12.00 to	12.50
Short shov. steel turnings	6.00 to	6.50
Short mixed borings and turnings	6.00 to	6.50
Cast iron borings	6.00 to	6.50
No. 2 busheling	6.00 to	6.50
Steel car axles	11.00 to	11.50
Iron axles	11.00 to	11.50
No. 1 machinery cast	10.50 to	11.00
No. 1 cupola cast	8.50 to	9.00
Stove plate	8.50 to	8.75
Steel rails, 3 ft. and under	12.50 to	13.00
Cast iron carwheels	10.50 to	11.00
Industrial malleable	10.50 to	11.00
Railroad malleable	10.50 to	11.00
Chemical borings	7.50 to	8.00

BOSTON

Dealers' buying prices per gross ton:		
No. 1 heavy melting steel	$5.75 to	$6.25
Scrap T rails	5.75 to	6.25
No. 2 steel	5.00 to	5.25
Breakable cast	6.00 to	6.50
Machine shop turnings	1.75 to	2.00
Bundled skeleton, long	4.00 to	4.25
Forge flashings	4.00 to	4.25
Blast furnace scrap	2.00 to	2.50
Shafting	11.00 to	11.25
Steel car axles	10.50 to	11.00
Cast iron borings, chemical	8.25 to	8.50
Stove plate	....	6.50
Per gross ton delivered consumers' yards:		
Textile cast	$7.50 to	$9.00
No. 1 machinery cast	7.50 to	9.00
Railroad malleable	11.00 to	11.50

NEW YORK

Dealers' buying prices per gross ton:		
No. 1 heavy melting steel	*$7.00	†$8.00
No. 2 heavy melting steel	*5.75 to	†6.75
Heavy breakable cast	$7.00 to	7.50
No. 1 machinery cast	....	8.00
No. 2 cast	6.25 to	6.75
Stove plate	....	5.50
Steel car axles	10.75 to	11.50
No. 1 railroad wrought	7.50 to	8.00
No. 1 yard wrought, long	6.50 to	7.00
Spec. iron and steel pipe	4.50 to	5.00
Forge fire	5.50 to	6.00
Rails for rerolling	8.50 to	9.00
Short shoveling turnings	2.50 to	3.00
Machine shop turnings	2.50 to	3.00
Cast borings	3.50 to	3.75
No. 1 blast furnace	2.00 to	2.50
Cast borings (chemical)	11.00 to	11.50
Unprepared yard iron and steel	3.00 to	4.00
Per gross ton, delivered local foundries:		
No. machinery cast		$10.75
No. 1 hvy. cast (cupola size)		9.75
No. 2 cast		8.25

*For direct car loading only.
†Loading on barge.

BIRMINGHAM

Per gross ton delivered consumers' yards:		
Heavy melting steel	....	$10.00
Scrap steel rails	....	9.00
Short shoveling turnings	....	5.50
Stove plates	$7.00 to	7.50
Steel axles	10.50 to	11.00
Iron axles	10.50 to	11.00
No. 1 railroad wrought	....	7.00
Rails for rolling	....	10.50
No. 1 cast	9.00 to	9.50
Tramcar wheels	9.00 to	9.50
Cast iron borings, chem.	....	8.00

ST. LOUIS

Per gross ton delivered consumers' yards:		
Selected heavy steel	$8.75 to	$9.25
No. 1 heavy melting	8.50 to	9.00
No. 2 heavy melting	7.00 to	7.50
No. 1 locomotive tires	9.50 to	10.00
Misc. stand-sec. rails	8.75 to	9.25
Railroad springs	10.25 to	10.75
Bundled sheets	6.75 to	7.25
No. 2 railroad wrought	8.00 to	8.50
No. 1 busheling	5.00 to	5.50
Cast iron borings and shoveling turnings	4.75 to	5.25
Rails for rolling	9.75 to	10.25
Machine shop turnings	4.50 to	5.00
Heavy turnings	5.50 to	6.00
Steel car axles	10.50 to	11.00
Iron car axles	13.00 to	13.50
No. 1 railroad wrought	5.50 to	6.00
Steel rails less than 3 ft.	10.75 to	11.25
Steel angle bars	9.00 to	9.50
Cast iron carwheels	8.00 to	8.50
No. 1 machinery cast	9.00 to	9.50
Railroad malleable	9.00 to	9.50
No. 1 railroad cast	8.50 to	9.00
Stove plate	6.50 to	7.00
Agricult. malleable	9.00 to	9.50

DETROIT

Dealers' buying prices per gross ton:		
Heavy melting steel	$7.00 to	$7.50
Borings and short turnings	5.00 to	5.50
Long turnings	$4.00 to	$4.50
No. 1 machinery cast	9.00 to	9.50
Automotive cast	10.00 to	10.50
Hydraul. comp. sheets	7.00 to	7.50
Stove plate	6.50 to	7.00
New factory busheling	6.00 to	6.50
Old No. 2 busheling	4.25 to	4.75
Sheet clippings	3.50 to	4.00
Flashings	6.00 to	6.50
Low phos. plate scrap	7.50 to	8.00

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$5.50	$5.50
Rails scrap	6.00	4.50
Machine shop turnings	2.50	2.50
Boiler plate	4.50	4.50
Heavy axle turnings	2.50	2.50
Cast borings	3.00	3.00
Steel borings	2.00	2.00
Wrought pipe	2.50	2.50
Steel axles	4.50	6.00
Axles wrought iron	4.50	6.50
No. 1 machinery cast	7.75	9.00
Stove plate	4.50	5.00
Standard carwheels	7.25	7.00
Malleable	6.75	7.00

ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

Lake Superior Ores

Delivered Lower Lake Ports

	Per Gross Ton
Old range, Bessemer, 51.5% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

Foreign Ore

C.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	9.50c.
Iron, low phos., Swedish, average 68½% iron	9.50c.
Iron, basic or foundry, Swedish, average, 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron	9c
Manganese, Caucasian, washed 52%	24c.
Manganese, African, Indian, 44-48%	21c.
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48½	20c.

	Per Net Ton Unit
Tungsten, Chinese, wolframite, duty paid, delivered*	$18.00 to $18.75
Tungsten, domestic scheelite, delivered†	17.00

	Per Gross Ton
Chrome, 45%, Cr_2O_3, crude, c.i.f. Atlantic Seaboard	$17.00
Chrome, 48% Cr_2O_3, c.i.f. Atlantic Seaboard	20.00

*Quotations nominal in absence of sales.
†Nominal; no supplies available.

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines for all-rail shipment	$17.00
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	18.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	$17.50 to 18.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	19.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville Prompt	$3.85
Furnace, f.o.b. Connellsville Prompt	$4.60 to 5.60
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	9.00
Foundry, by-product, Cleveland, delivered	$9.25
Foundry, Birmingham	6.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.80 to $2.05
Mine run coking coal f.o.b. W. Pa.	2.05 to 2.25
Gas coal, ¾-in. f.o.b. Pa. mines	2.25 to 2.55
Mine run gas coal, f.o.b. Pa. mines	2.05 to 2.45
Steam slack, f.o.b. W. Pa. mines	1.55 to 1.65
Gas slack, f.o.b. W. Pa. mines	1.90 to 2.10

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. f.o.b. Baltimore	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. del'd Chicago	
No. 3 industrial fuel oil	3.88c.
No. 5 industrial fuel oil	3.38c.

Per Gal. f.o.b. Cleveland	
No. 3 distillate	5.75c.
No. 4 industrial	5.50c.
No. 5 industrial	4.75c.

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$45.00	$40.00
Maryland	45.00	40.00
New Jersey	55.00	43.00
Ohio	45.00	40.00
Kentucky	45.00	40.00
Missouri	45.00	40.00
Illinois	45.00	40.00
Ground fire clay, per ton	7.00	

Chrome Brick

	Per Net Ton
Standard size	$45.00

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$45.00
Chicago	54.00
Birmingham	55.00
Silica clay, per ton	8.00

Magnesite Brick

	Per Net Ton
Standard sizes, burned, f.o.b. Baltimore and Chester, Pa.	$65.00
Unburned, f.o.b. Baltimore	55.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

Warehouse Prices for Steel Products

PITTSBURGH

Base per Lb.

Plates	3.20c.
Structural shapes	3.20c.
Soft steel bars and small shapes	3.00c.
Reinforcing steel bars	3.00c.
Cold-finished and screw stock—	
Rounds and hexagons	*3.45c.
Squares and flats	*3.45c.
Hoops and bands under ¼ in.	3.35c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles	3.55c.
Galv. sheets (No. 24), 25 or more bundles	4.10c.
Hot-rolled sheets (No. 10)	3.10c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.32
Spikes, large	2.90c.
Track bolts, all sizes, per 100 count, 65 per cent off list.	
Machine bolts, 100 count, 65 per cent off list.	
Carriage bolts, 100 counts, 65 per cent off list.	
Nuts, all styles, 100 count, 65 per cent off list.	
Large rivets, base per 100 lb.	$3.50
Wire, black, soft ann'l'd, base per 100 lb.	*2.70c.
Wire, galv. soft, base per 100 lb.	*2.925c.
Common wire nails, per keg	*2.834c.
Cement coated nails, per keg	*2.834c.

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 9999 lb.

*Delivered in Pittsburgh switching district.

CHICAGO

Base per Lb.

Plates and structural shapes	3.25c.
Soft steel bars	3.05c.
Cold-fin. steel bars and shafting	
Rounds and hexagons	3.50c.
Flats and squares	3.50c.
Hot-rolled strip	3.45c.
Hot-rolled annealed sheets (No. 24)	4.10c.
Galv. sheets (No. 24)	4.70c.
Hot-rolled sheets (No. 10)	3.20c.
Spikes (9/16 in. and lighter)	3.50c.
Track bolts	4.65c.
Rivets, structural (keg lots)	3.50c.
Rivets, boiler (keg lots)	3.60c.

Per Cent Off List

Machine bolts	60 and 5
Carriage bolts	60 and 5
Coach and lag screws	60 and 5
Hot-pressed nuts, sq. tap. or blank	60 and 5
Hot-pressed nuts, hex. tap or blank	60 and 5
Hex. head and cap screws	85
Cup point set screws	70 and 10
Flat head bright wood screws	37½ and 10
Spring cotters	50
Stove bolts in full packages	..70 and 10
Rd. hd. tank rivets, 7/16 in. and smaller	57½
Wrought washers	$5.00 off list
No. 8 black ann'l'd wire per 100 lb.	$3.85
Com. wire nails, base per keg	3.05c.
Cement c't'd nails, base per keg	3.05c.

NEW YORK

Base per Lb.

Plates, ¼ in. and heavier	3.45c.
Structural shapes	3.42c.
Soft steel bars, small shapes	3.32c.
Iron bars	3.32c.
Iron bars, swed. charcoal	..6.50 to 7.25c.
Cold-fin. shafting and screw stock; Rounds and hexagons	3.92c.
Flats and squares	4.42c.
Cold-roll. strip, soft and quarter hard	3.52c.
Hoops	3.67c.
Bands	3.67c.
Hot-rolled sheets (No. 10)	3.42c.
Hot-rolled ann'l'd sheets (No. 24*)	4.05c.
Galvanized sheets (No. 24*)	4.65c.
Long terne sheets (No. 24)	5.40c.
Standard tool steel	11.00c.
Wire, black annealed (No. 10)	3.30c.
Wire, galv. (No. 10)	3.80c.
Tire steel, 1 x ½ in. and larger	3.65c.
Open hearth spring steel	4.00c. to 10.00c.
Common wire nails, base, per keg	$3.25

Per Cent Off List

Machine bolts, cut thread:	
Up to 1 in. dia. inclusive	60
Over 1 in. dia.	50
Carriage bolts, cut thread:	
Up to ½ in. dia. inclusive	60
Over ½ in. dia.	50

Per 100 Ft.

Boiler tubes:	
Lap welded, 2-in.	$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

Base per Lb.

Plates and struc. shapes	3.49c.
Bars, soft steel or iron	3.29c.
Cold-fin. rounds, shafting, screw stock	3.74c.
Hot-rolled annealed sheets (No. 24)	3.94c.
Galv. sheets (No. 24)	4.54c.
Hot-rolled sheets (No. 10)	3.44c.
Black corrug. sheets (No. 24)	3.99c.
*Galv. corrug. sheets	4.59c.
Structural rivets	3.84c.
Boiler rivets	3.94c.

Per Cent Off List

Tank rivets, 7/16 in. and smaller	.. 60
Machine and carriage bolts, lag screws, fittings up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts	
1000 lb. or over	60
200 to 999 lb.	55 and 5
100 to 199 lb.	50 and 5
Less than 100 lb.	50

*No. 26 and lighter take special prices.

PHILADELPHIA

Base per Lb.

*Plates, ¼-in. and heavier	3.00c.
*Structural shapes	3.00c.
*Soft steel bars, small shapes, iron bars (except bands)	3.00c.
‡Reinforc. steel bars, sq. twisted and deformed	2.955c.
Cold-finished steel bars	3.73c.
*Steel hoops	3.55c.
*Steel bands, No. 12 and 3/16 in., incl.	3.30c.
Spring steel	5.00c.
†Hot-rolled anneal. sheets (No. 24)	3.80c.
†Galvanized sheets (No. 24)	4.40c.
*Hot-rolled annealed sheets (No. 10)	3.20c.
Diam. pat. floor plates, ¼ in.	5.00c.
Swedish iron bars	6.25c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

‡For less than 2000 lb.

CLEVELAND

Base per Lb.

Plates and struc. shapes	3.36c.
Soft steel bars	3.05c.
Reinforc. steel bars	*2.10c.
Cold-finished steel bars	3.40c.
Flat rolled steel under ¼ in.	3.51c.
Cold-finished strip	†3.20c.
Hot-rolled annealed sheets (No. 24)	4.16c.
Galvanized sheets (No. 24)	4.76c.
Hot-rolled sheets (No. 10)	3.26c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.61c.
Black ann'l'd wire, per 100 lb.	$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.40

*Plus mill, size and quantity extras.

†Outside delivery 10c. less.

CINCINNATI

Base per Lb.

Plates and struc. shapes	3.45c.
Bars, soft steel or iron	3.25c.
New billet reinforc. bars	3.10c.
Rail steel reinforc. bars	3.10c.
Hoops and bands, 3/16 in. and lighter	3.60c.
Cold-finished bars	3.70c.
Hot-rolled annealed sheets (No. 24)	4.25c.
Galv. sheets (No. 24)	4.85c.
Hot-rolled sheets (No. 10)	3.35c.
Structural rivets	4.35c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb.	..$3.00
Com. wire nails, base per keg (10 to 49 kegs)	2.65
Larger quantities	2.50
Cement c't'd nails, base 100-lb. keg.	2.95
Chain, 1-in., per 100 lb.	8.35

Net per 100 Ft.

Seamless steel boiler tubes, 2-in.	$17.89
4-in.	41.69
Lap-welded steel boiler tubes, 2-in.	16.61
4-in.	38.72

BUFFALO

Base per Lb.

Plates	3.40c.
Struc. shapes	3.30c.
Soft steel bars	3.10c.
Reinforcing bars	2.10c.
Cold-fin. flats and sq.	3.55c.
Round and hex.	3.55c.
Cold-rolled strip steel	5.25c.
Hot-rolled annealed sheets (No. 24)	4.05c.
Heavy hot-rolled sheets, 3/16 in., 24 to 48 in. wide	3.67c.
Galv. sheets (No. 24)	4.65c.
Bands	3.57c.
Hoops	3.57c.
Hot-rolled unannealed sheets	3.32c.
Com. wire nails, base per keg	$3.00
Black wire, base per 100 lb.	3.45c.

BOSTON

Per Lb.

Beams, channels, angles, tees, zees	3.42c.
H beams and shapes	3.42c.
Plates—sheared, tank and univ. mill, ¼ in. thick and heavier	3.42c.
Floor plates, diamond pattern	5.18c.
Bar and bar shapes (mild steel)	3.25c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.50c. to 4.50c.
Half rounds, half ovals, ovals and bevels	4.50c.
Tire steel	4.50c.
Cold-finished rounds and hexagons	3.70c.
Cold-rolled strip steel	5.20c.
Cold-finished squares and flats	4.20c.
Blue annealed sheets, No. 10 ga.	3.25c.
One pass cold-rolled sheets No. 24 ga.	3.50c.
Galvanized steel sheets, No. 24 ga.	4.60c.
Lead coated sheets, No. 24 ga.	5.65c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

PACIFIC COAST

Base per Llb.

	San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.55c.	3.70c.	3.55c.
Shapes, standard	3.55c.	3.70c.	3.55c.
Soft steel bars	3.60c.	3.70c.	3.55c.
Reinforcing bars	3.50c.	3.50c.	3.50c.
Hot-rolled annealed sheets (No. 24)	4.40c.	4.35c.	4.40c.
Hot - rolled sheets (No. 10)	3.75c.	3.80c.	3.75c.
Galv. sheets (No. 24)	5.00c.	5.05c.	5.00c.
Cold finished steel Rounds	5.95c.	5.95c.	4.75c.
Squares and hexagons	7.20c.	7.20c.	6.00c.
Flats	7.70c.	7.70c.	7.00c.
Common wire nails —base per keg less carload	$3.40	$3.25	$3.35

All items subject to differentials for

British Blast-Furnace Practice Detailed

BRITISH blast-furnace practice has been tabulated in monumental detail by a committee of the (British) Iron and Steel Institute. Particulars have been gathered for some 14 individual furnaces engaged in producing foundry iron, some 21 furnaces in basic production and 13 stacks making Bessemer iron. The analyses and characteristics of the ores, limestone, dolomite and coke are included in the mass of data, as well as dimensions of the furnace lines, sizes and analyses of the brick work, construction and operating figures of the stoves, and practice as to the dust catchers, tuyeres, cooling arrangements, casting and charging. Besides operating statistics commonly obtainable, records are included of the utilization of the gas and slag. The report of the committee was a feature of the meeting of the Institute held in London, May 31.

The practice in connection with Canadian and Indian furnaces came under the committee's purview, and it is stated that the results in these cases emphasize the desirability of an investigation into the possibilities of concentrating and grading low-grade British ores. The committee adds that preliminary investigation suggests that certain British ores can be beneficiated and recommends that a special study of the subject be undertaken.

Quality of pig iron, the committee also points out, has an important bearing on the fuel consumption and furnace output, adding: "Silicon is the most important constituent in its effect on furnace economy. At one plant 4 per cent silicon iron required 400 lb. of coke more per ton than iron with 2 per cent silicon. At another plant, an increase of 225 lb. of coke was allowed for a 1 per cent increase in the silicon." It appears that the subject is to receive attention by the British Cast Iron Research Association in connection with the occasional demand of foundries for high-silicon iron for mixing purposes.

In respect to the sibe of individual furnaces, the report is doubtful that conditions in Great Britain will be such as to justify in the future the large outputs of the United States and the Dominions. "The difficulties of maintaining the output of such large producing units during the past three years are in themselves a justification of the British policy of smaller furnaces and greater flexibility." It is added, however, that with improved ores, graded, and if possible concentrated, a considerable increase in furnace output can be anticipated with losing flexibility.

Lead Steady Despite Poor Statistics; Zinc Sales at 4.20c.; Total 4400 Tons

Straits Tin Lower Here; Artificial London Support Prevents Additional Decline—Copper Market Virtually Inactive

NEW YORK, June 26.—Only sporadic copper sales are being made and the market has a general lifeless aspect. The code-authority price is unaltered at 9c. a lb., Connecticut valley, but buyers are closely watching the situation for the first indication of a threatened movement upward. H. O. King, the code administrator, has intimated that a 10c. price is very likely, whereas many operators are thinking and talking 11c. and 12c. metal. Such a trend upward is entirely possible under the protection of code restrictions and NRA's restraint on the liquidation of America's large surplus stock. The code authority has increased the sales quotas of secondary producers to 10,500 tons and primary producers' quotas total 20,500 tons. Stocks in the United States declined 16,400 tons in May. This was a result of a heavy reduction in output as deliveries were 16,400 tons lower than in the preceding month. The export market is moderately active at a current level of 7.875c. a lb., c.i.f., and the spread between the two markets is now the widest in recent market history.

Tin

There is practically no consumer demand despite the comparatively attractive price for Straits tin here. London quotations rose somewhat during the week almost entirely on the strength of the supporting purchases of one firm which is supposedly allied with the buffer pool. This activity prevented the American market from falling off even more than it did during the week. The world tin market is suffering from the loss of the German outlet for metal, and sentiment is generally adversely influenced by the poor industrial prospects for the summer in this country.

Zinc

Spelter sellers have again experienced a comparatively satisfactory week notwithstanding the apparent quiet condition of the market. Bookings were about 4400 tons at 4.20c., East St. Louis, for positions into September, as compared with 3200 tons sold in the preceding week. Apparently consumers do not believe Prime Western will break 4.20c. despite the continued weakness of Tri-State concentrates. Joplin ore production is still at a high level and stocks have mounted 2000 tons to 21,000 tons. So far curtailment discussions are uncertain and the actual intention of mines is quite vague. The quotations are unaltered at $25 and $26 a ton for flotation and prime grades respectively, and it is doubtful that a reduction will be made inasmuch as this level represents very little margin of profit for even the large concerns.

Lead

This metal is still steadily established at 4c. a lb., New York, with no apparent prospect of a decline despite the very disappointing statistics and quiet condition of the market. Consumers are more cautious regarding forward commitments, and present bookings now approximate 16,000 tons for July delivery and about 1500 tons for August on average-price contracts. Refined stocks increased 10,500 tons in May and now stand at 233,350 tons, the largest on record. Production increased about 7800 tons in May, but this increase came mostly from a more rapid conversion of concentrates and does not represent an equivalent increase in total stocks. Mine output showed little change for the period.

Antimony

The Chinese market has declined gradually during the past few weeks but present prices are somewhat steadier. Spot prices are a little easy as a reflection of lessened European demand. New York quotations are now 7.80c. a lb. for spot duty paid, and June-July shipment from China is generally quoted at 5.97c. a lb., c.i.f.

Tungsten

A fair demand for ferrotungsten has been evidenced for the past month and prices are consequently steady at $1.40 to $1.50 a lb. contained W in carloads and $1.55 to $1.60 for less than carloads. Tungsten ores continue at a high level as a result of the Chinese Government monopoly. The current market is a little easier due to less active demand from the Continent and spot Wolframite is nominally available at $18 to $18.75 per net ton unit, duty paid. Domestic output is almost completely covered by contracts, and in the absence of sales the market is judged at around $17 for domestic scheelite delivered.

The Week's Prices. Cents Per Pound for Early Delivery

	June 20	June 21	June 22	June 23	June 25	June 26
Electrolytic copper, N. Y.*‡	8.75	8.75	8.75	8.75	8.75	8.75
Lake copper, Eastern delivery*	9.12½	9.12½	9.12½	9.12½	9.12½	9.12½
Straits tin, Spot, N. Y.	51.00	50.87½	51.00	....	51.12½	50.87½
Zinc, East St. Louis	4.20	4.20	4.20	4.20	4.20	4.20
Zinc, New York	4.55	4.55	4.55	4.55	4.55	4.55
Lead, St. Louis	3.85	3.85	3.85	3.85	3.85	3.85
Lead, New York	4.00	4.00	4.00	4.00	4.00	4.00

*Blue Eagle copper. ‡Refinery; price ¼c. higher in Connecticut Valley.

Quotations below cover wholesale lots, f.o.b. New York.

Aluminum, 98-99 per cent, 22.90c. a lb.
Aluminum, remelt, No. 12 (grade 3), 13.50c. a lb., average for week.
Nickel electrolytic cathode, 35c. a lb.; shot and ingot, remelt electro, 36c. a lb.
Antimony, 7.90c. a lb. Quicksilver, per flask of 76 lb., $75.
Brass ingots, 85-5-5-5, 8.75c. a lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	53.00c. to 54.00c.
Tin, bar	55.00c. to 56.00c.
Copper, Lake	10.25c. to 11.00c.
Copper, electrolytic	10.00c. to 10.50c.
Copper, castings	9.75c. to 10.75c.
*Copper sheets, hot-rolled	16.00c.
*High brass sheets	14.50c.
*Seamless brass tubes	17.00c.
*Seamless copper tubes	17.25c.
*Brass rods	13.00c.
Zinc, slabs	5.75c. to 6.75c.
Zinc sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	4.75c. to 5.75c.
Lead, bar	5.75c. to 6.75c.
Lead, sheets	7.75c.
Antimony, Asiatic	9.75c.
Alum., virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	32.50c. to 33.50c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	54.25c.
Tin, bar	56.25c.
Copper, Lake	10.00c.
Copper, electrolytic	10.00c.
Copper, castings	9.75c.
Zinc, slab	5.75c. to 6.00c.
Lead, American pig	5.00c. to 5.25c.
Lead, bar	8.00c.
Antimony, Asiatic	9.00c.
Babbitt metal, medium grade	18.50c.
Babbitt metal, high grade	58.25c.
Solder, ½ and ½	33.00c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.75c.	7.50c.
Copper, hvy. and wire	6.50c.	7.25c.
Copper, light and bottoms	5.50c.	6.50c.
Brass, heavy	3.62½c.	4.37½c.
Brass, light	3.12½c.	3.75c
Hvy. machine composition	5.25c.	6.125c.
No. 1 yel. brass turnings	4.50c.	5.25c.
No. 1 red brass or compos. turnings	4.37½c.	5.37½c.
Lead, heavy	3.00c.	3.50c.
Zinc	2.50c.	3.125c.
Cast aluminum	9.62½c.	10.75c.
Sheet aluminum	11.00c.	12.50c.

Reinforcing Steel

Awards 3200 Tons—New Projects 5200 Tons

Boston, 280 tons, Stonybrook sewer, to Northern Steel Co.

Wellesley, Mass., 210 tons, physics-chemical building, to Joseph T. Ryerson & Son, Inc.

State of Connecticut, 225 tons, highway, to Truscon Steel Co.

State of Connecticut, 100 tons, mesh for highway near New Haven, to American Steel & Wire Co.

Suffolk and Seneca Counties, N. Y., 345 tons, mesh for highway construction, to American Steel & Wire Co.

Westchester County, N. Y., 170 tons, sewer, to Truscon Steel Co.

State of Illinois, 125 tons, road work, to Calumet Steel Co.

Alton, Ill., 1000 tons, reinforcement for 4300 units of hollow spun concrete tapered piling, 500 tons each to Laclede Steel Co. and Missouri Rolling Mills Corpn.

Pueblo, Colo., 650 tons, State hospital dormitory, to Colorado Builders Supply Co.

State of Colorado, 100 tons, seven bridges in two counties; to unnamed bidders.

NEW REINFORCING BAR PROJECTS

Boston, 250 tons, Stonybrook sewer, section 13.

Tewksbury, Mass., 120 tons, State hospital dining hall and kitchen.

Rockland County, N. Y., 105 tons, State hospital.

Burlington County, N. J., 210 tons, highway; bids until July 9.

Hunterdon County, N. J., 105 tons, crossing elimination; bids until July 9.

Niagara Falls, N. Y., 300 tons, city filtration plant.

Buffalo, 150 tons, Grand Island bridge.

Columbus, Ohio, 3000 tons, sewer construction; Bryant & Detwiler Co., Detroit, general contractor.

Lexington, Ky., 250 tons, grade crossing elimination; Temple Foundation Co., Cincinnati, general contractor.

State of Illinois, 700 tons, road work; bids taken June 26.

Imports of Bendix Drive Springs Stopped

WASHINGTON, June 19.—Imports of Bendix drive springs, except those made under the license of the American owner, are prohibited until March 4, 1935, as the result of approval by President Roosevelt of findings of the Tariff Commission. The commission acted upon complaint of the Bendix Aviation Corpn., Chicago, owner of the patent covering the engine starting apparatus known as the Bendix drive spring or starter spring, and the Eclipse Machine Co., Elmira Heights, N. Y., which manufactures the Bendix starter and parts under license.

Proceeding under Section 337 of the Hawley-Smoot tariff act, the commission conducted an investigation and found that the unlawful importation and sale of drive springs (Bendix springs) for engine starting apparatus has substantially injured, and if permitted to endure, will continue to injure the industry in making and selling such drive springs in the United States. The President, approving this finding, also directed the Secretary of the Treasury to instruct customs officers to exclude imports of these springs until March 4 of next year, the expiration date of the governing patent, except where the importation is made under license of the registered owner of the United States letters patent No. 1,258,302. The effect of this action is to make final the temporary order of exclusion, except under bond, issued by the President on Jan. 8, 1934.

The drive springs are made under contract for the Eclipse Machine Co. by the Wallace Barnes Co., Bristol, Conn. The respondents named in the complaint are certain dealers, most of whom do business on the West coast, and certain foreign exporters.

The drive spring involved is of a distinctive type of coiled and flattened metal and used in engine starting apparatus for forming a yielding driving connection therein in the line of transmission of power. Approximately 85 per cent of the automobiles in the world are equipped with this type of drive spring.

WYCKOFF

DRAWN STEEL CO.

With a combined capacity of more than 25,000 tons of finished steels per month, the two modern plants of the Wyckoff Drawn Steel Company are backed by a coast to coast organization of district representatives serving every large industrial center throughout the country. Their services as well as those of our plant mechanical and metallurgical departments are always available in solving any difficult or perplexing problem. Let us cooperate with you.

WYCKOFF DRAWN STEEL COMPANY

General Offices—AMBRIDGE, PENNA.
Mills—AMBRIDGE, PENNA., and CHICAGO, ILL.

Fabricated Structural Steel

INCLUDING 1130 tons for a distillery building at Linden, N. J., lettings totaled only 8700 tons, compared with 28,000 tons last week and 16,200 tons two weeks ago. New projects, at 26,750 tons, are the second largest for any week this year. Outstanding new jobs are 8100 tons for three pier sheds in New York on the North River, 5200 tons for a toll bridge at Bettendorf, Iowa, and 1975 tons for sewer construction in the Sanitary District, Chicago. The Fort Peck Dam, Fort Peck, Mont., will require 15,000 to 17,000 tons of sheet piling, on which bids will be taken July 9. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Malden, Mass., 100 tons, church, to Croisser-Shlager Iron Works.

New York, 135 tons, administration building for Seton Hospital, to Ingalls Iron Works Co.

Linden, N. J., 1130 tons, distillery building, to McClintic-Marshall Corpn.

Hazleton, Pa., 360 tons, department store, to Weatherly Steel Co., Philadelphia.

Scranton, Pa., 140 tons, bridge beams, to Phoenix Bridge Co.

Woodbourne, Pa., 150 tons, State highway bridge, to McClintic-Marshall Corpn.

Pittsburgh, 400 tons, coal washer building for Koppers Co., to Ohio Structural Steel Co.

Van Bibber, Md., 220 tons, State highway bridge, to McClintic-Marshall Corpn.

THE SOUTH

Lexington, Ky., 170 tons, State highway bridge, to McClintic-Marshall Corpn.

Eldorado, Ark., 550 tons, bridge, to Arkansas Foundry & Machine Co.

Coleman County, Tex., 125 tons, to North Texas Iron & Steel Co., previously reported to an unnamed fabricator.

CENTRAL STATES

Grand Trunk Western Railway, 130 tons, bridge at Lansing, Mich., to American Bridge Co.

Columbus, Ohio, 220 tons, Masonic Temple, to C. E. Morris Co.

Chicago, 265 tons, Calumet sewage treatment plant, to Continental Bridge Co.

Madison County, Ill., 1000 tons, viaduct route three, to Midland Structural Steel Co.

Peoria, Ill., 700 tons, viaduct route eight, to Mississippi Valley Structural Steel Co.

Melrose Park, Ill., 680 tons, State highway bridge, to McClintic-Marshall Corpn.

Winneconne, Wis., 700 tons, Wolf River bascule bridge, to Worden-Allen Co.

Webster County, Iowa, 465 tons, truss spans, to Pittsburgh-Des Moines Steel Co.

Butler County, Mo., 250 tons, bridge, to Stupp Brothers Bridge & Iron Co.

Omaha, Neb., 3800 tons, South Omaha River bridge, to American Bridge Co.; Kansas City Bridge Co., general contractor.

WESTERN STATES

Douglas County, Ore., 650 tons, bridge, to Poole & McGonigle, Portland.

Snohomish County, Wash., 125 tons, State bridge, to Pacific Car & Foundry Co.

Seattle, Wash., 100 tons, Kress store, to Isaacson Iron Works.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Newton, Mass., 100 tons, incinerator.

New York, 8100 tons, sheds for North River piers Nos. 88, 90 and 92; bids to be submitted early in July.

Port Ivory, Stanton Island, 230 tons, building for Procter & Gamble Co., H. K. Ferguson Co., Cleveland, contractor.

Saratoga Springs, N. Y., 500 tons, hotel and sanitarium.

Binghamton, N. Y., 650 tons, post office; bids readvertised.

Orangeburg, N. J., 480 tons, State infirmary building.

Three Rivers, N. J., 225 tons, State highway bridge.

Pittsburgh, 410 tons, warehouse for United States Bureau of Mines.

Wilmerding, Pa., 200 tons, building for Westinghouse Air Brake Co.

Westminster, Md., 125 tons, Western Maryland College dormitory building.

Reading, Pa., 500 tons, school; bids to be opened July 6 by Reading School District.

Philadelphia and Montgomery Counties, Pa., 240 tons, bridge section No. 4, State highway; bids July 2.

THE SOUTH

Mobile, Ala., 280 tons, court house and custom house.

San Antonio, Tex., 475 tons, bridge.

Center, Tex., 300 tons, bridge.

Weatherford, Tex., 200 tons, bridge.

Benton, Ark., 200 tons, building.

State of Arkansas, 275 tons, highway bridge.

CENTRAL STATES

Ravenna, Ohio, 130 tons, garage for State highway department.

Newcomerstown, Ohio, 600 tons, bridge.

State of Michigan, 1330 tons, eight bridges for State highway department.

Detroit, 1400 tons, hot strip mill for Ford Motor Co. River Rouge plant.

Chicago, 1975 tons, contract No. 9, for sewer, sanitary district.

Niles Center, Ill., 480 tons, viaduct over Chicago & Northwestern Railway; American Bridge Co., low bidder.

Niles Center, Ill., 435 tons, viaduct over Chicago, North Shore & Milwaukee Railroad; American Bridge Co., low bidder.

Lemont, Ill., 1000 tons, bridge over Sag Channel; fabricators' bids to be taken by State today.

Lemont, Ill., 1000 tons, bridge over drainage canal; fabricators' bids to be taken by State today.

Bettendorf, Iowa, 5200 tons, toll bridge for city of Davenport bridge commission, Davenport, Iowa.

WESTERN STATES

Rockyford, Colo., 350 tons, State highway bridge.

State of Wyoming, 100 tons, bridges in Campbell and Albany counties; bids under advisement.

Fort Peck, Mont., 15,000 to 17,000 tons sheet piling for dam; bids July 9.

Olympia, Wash., 1600 tons, State bridges in Deception and Canoe Passes; Columbia Steel Co., low bidder.

Camp Sims, Wash., 125 tons, Government warehouse.

FABRICATED PLATE

AWARDS

Bridgewater, Mass., 200 tons, standpipe and elevated tank, to Chicago Bridge & Iron Works.

Rocky Mount, N. C., 465 tons, tank, to Chicago Bridge & Iron Works.

NEW PROJECTS

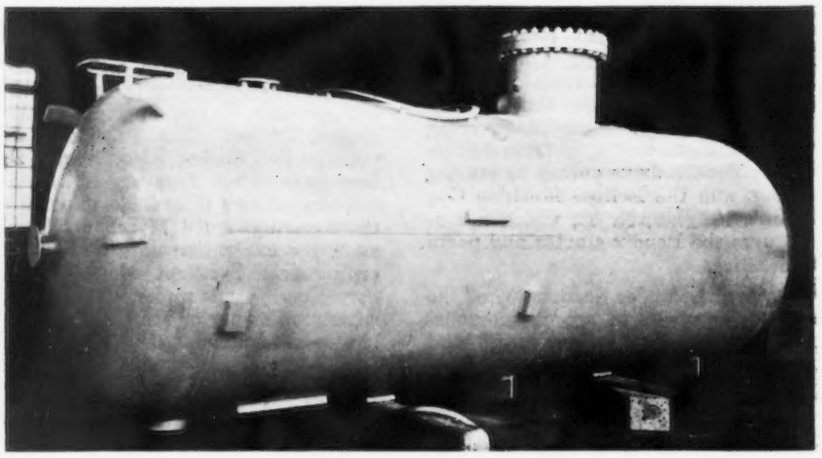
Bremerton, Wash., 100 tons, material for Puget Sound Navy Yard, Schedule 2687; bids under advisement.

Tacoma, Wash., 18,940 ft. of 52 and 63-in. pipe; alternates on steel and reinforced concrete; bids soon.

San Francisco, 1000 tons, Juniper and Slout Boulevard pipe line; bids July 6.

Welds Locomotive Tank

THE welded tank here pictured is that used in the fireless steam locomotive built recently by the Heisler Locomotive Works, Erie, Pa., and illustrated in THE IRON AGE of May 31, page 76. The locomotive is believed to be the first to use a fusion welded tank. The tank, fabricated by the Struthers-Wells Co., Warren, Pa., is 69 in. in diameter and was designed for working pressure of 215 lb. Welding was done by the shielded arc process using equipment made by the Lincoln Electric Co., and both the welding and testing were in accordance with Class I requirements of the unfired pressure vessel section of the A.S.M.E. Boiler Code. The illustration shows the tank before it was lagged and jacketed.



Pipe Lines

United States Engineer Office, Kansas City, Mo., asks bids until July 16 for 240 pieces, 28-in. i.d., ¼-in. plate, each piece 12 ft. 10 in. long, and 500 pieces, same size, for connecting link lines (Circular 167).

Canton, Miss., plans welded steel pipe line to natural gas properties in Jackson County, now being secured, also steel pipe line distribution system. Bond issue of $160,000 has been authorized.

Stanolind Oil & Gas Co., Salt Lake City, Utah, is considering new 4-in. welded steel pipe line from Iles oil field district, Colo., to Craig, Colo., and vicinity, about 61 miles. Cost close to $200,000. Headquarters are at Tulsa, Okla.

Texas Gas Utilities, Eagle Pass, Tex., let contract to Nicholas Saigh Co., Builders' Exchange Building, San Antonio, Tex., for reconstruction of main 10-in. steel pipe line for natural gas supply, about 10 miles. Cost close to $50,000.

Southern Alkali Co., Corpus Christi, Tex., plans steel pipe line to natural gas properties to be developed in lower coastal district, about 60 miles distant, for service for power station at new alkali works at Corpus Christi, now under construction.

United States Engineer Office, Kansas City, Mo., asks bids until July 8 for galvanized steel pipe, black steel pipe, and wrought steel pipe caps (Circular 1091).

Cast Iron Pipe

Marlboro, Mass., has awarded 100 tons to Warren Foundry & Pipe Corpn.

Elizabethtown, N. C., asks bids until July 6 for 12,200 ft. of 6, 8 and 10-in., with fittings, valves, etc., for municipal water system; also for 75,000-gal. elevated steel tank and tower. Paul M. Van Camp, Patch Building, Southern Pines, N. C., is consulting engineer.

Bureau of Reclamation, Denver, closed bids June 27 for 1930 ft. of 6-in., bell and spigot (Proposal 38022-E).

Ordway, Colo., let contract to Construction Service, Inc., Tramway Building, Denver, for main pipe line and distribution lines for water supply, including new reservoir, at $87,055.48. Weiland Engineering Co., Pueblo, Colo., is consulting engineer.

Rapid City, S. D., plans new water pipe line, including large diameter trunk mains. Fund of $40,000 is being arranged. Earl M. Sneckenberger is city manager.

Hallettsville, Tex., plans water pipe line extensions; also 150,000-gal. elevated steel tank and tower. Bond issue of $23,000 has been authorized.

Constructing Quartermaster, Aberdeen Proving Ground, Aberdeen, Md., asks bids until July 6 for water pipe line (Circular 36).

Lovelock, Nev., plans about 6000 ft. of 6 and 8-in. for water supply; also wrapped steel pipe for main trunk system. Fund of $106,000 has been arranged for this and other waterworks development. King & Malone, 29 East First Street, Reno, Nev., are consulting engineers.

Parsons, Tenn., asks bids until July 5 for water pipe. Freeland, Roberts & Co., Independent Life Building, Nashville, Tenn., are consulting engineers.

Sedan, Kan., soon takes bids for pipe for water supply and other waterworks, including filter plant. Fund of $82,840 is being arranged. Black & Veatch, Mutual Building, Kansas City, Mo., are consulting engineers.

James B. Clow & Sons are low bidders on 17,113 ft. of 12-in. and 5072 ft. of 6-in. class C pipe for Madison, Wis., water main extension.

Madison, Wis., will take bids in about 60 days on 3000 ft. of 12-in. for connecting main to new pumping station.

Carlin, Nev., has awarded 280 tons to Pacific States Cast Iron Pipe Co.

BUNDYWELD

STEEL

TUBING

for

OIL · GAS AND HYDRAULIC BRAKE LINES

Bundyweld Steel Tubing combines the strength of steel with corrosion resisting properties, and sufficient ductility to permit easy fabrication. Its ability to withstand vibration and its great strength and recuperative properties make it superior for most installations. These have been proven both in the laboratory and in actual use. Today 75% of all gas, oil, brake, and vacuum lines are Bundyweld Steel Tubing!

It is rolled from strip steel, (previously copper coated on two sides) then Copper-Hydrogen-Electric-Welded into a solid structure. The reducing atmosphere in the welding process leaves the tube absolutely clean and free from scale. It may be heat-treated without injury.

Both I. D. and O. D. are held to tolerances of .003". Uniformity of wall thickness is an outstanding feature. Furnished in base sizes of $\frac{3}{16}$", ¼", $\frac{5}{16}$", $\frac{3}{8}$", $\frac{7}{16}$", ½", and $\frac{5}{8}$" in various wall thicknesses, it can be redrawn to any odd size required. Send blueprints or samples for quotations. Complete information upon request.

BUNDY TUBING CO.

DETROIT

Thaws Frozen Contents Of Open Cars

DURING freezing weather much difficulty is experienced at car dumping docks in dumping coal from open-top cars into boats because the coal freezes to the sides of the cars. It is customary to use steam jets directed against the sides and bottoms of the cars or to build fires between the tracks on both sides of the cars to thaw the ice, which prevents complete dumping of the coal. Both of these methods are found to be slow and costly.

To provide an efficient and economical method of thawing coal in cars before dumping, car-thawing equipment has been developed by the Wellman Engineering Co., Cleveland. The equipment consists of duplicate heating units located on opposite sides of the approach tracks leading to the car dumper and mounted on tracks laid at right angles to the car tracks. The units may be moved toward the car side to secure heat concentration on the car and away from the heated car to provide clearance for the passage of the car along the track.

Each unit comprises a structural frame movably mounted and carrying as a heating element a box approximately 10 ft. high and 50 ft. long, which is provided with perforated front plates through which the heated air is directed against the side of the car. Heat is supplied by an oil-burning furnace from which the products of combustion mixed with air are conducted to a blower and through suitable ducts to the heat box.

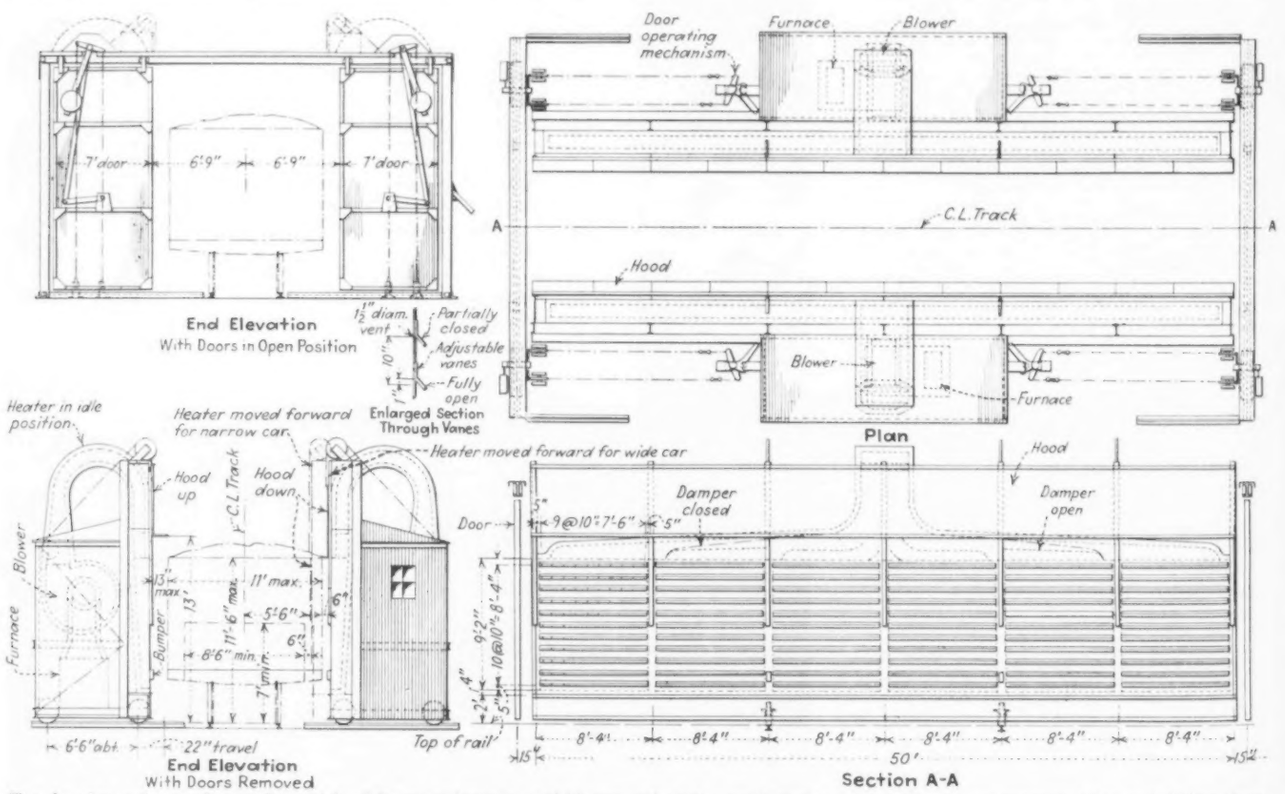
Sliding gates operated in conjunction with the heating units are provided at each end. The purpose of these is to prevent cold wind from blowing between the heaters while the car is in place. The movement of the heating units also actuates the gates. As the units move toward the sides of the car, the end gates close so that the car is completely surrounded. The end gates are of structural steel suspended by door hangers from an overhead track sufficiently high to clear the car rider. These doors are of light construction covered with flat steel plates. They are counterweighted and operated by cables and levers connected to the heating units in such a manner that the first movement of the units closes the gates and the units can move closer together to accommodate narrow cars.

The oil furnace and blower are enclosed and a hood is provided to close the opening between the top of the car and the heat box. Sufficient air is mixed with products of combustion to reduce the temperature to about 350 to 400 deg. Fahr., a temperature much higher than steam but not sufficient to damage the car.

It is estimated that this equipment is capable of thawing a car sufficiently in about 2 min. to loosen the coal frozen to the inside of the shell so that the contents may be dumped. Operation will require about 35 gal. of oil at 30 deg. Baume per hr. About 26,000 cu. ft. of air at 400 deg. Fahr. will be delivered against the car each minute by the two units.

Typical operation of the thawing equipment is as follows: The car will be stopped on the approach track between the two units and the car rider will leave the car and press a control button at one end of the heater. This will operate the automatic control. The first motion will be to move both units toward the sides of the car, when the units will stop by means of a limit switch. During this interval the hood will be lowered by a suitable mechanism until the sealing plates engage the top of the car sides, where they will be stopped by a limit switch. The end gates will be closed automatically by the movement of the heater units. Heat is applied to the car for a predetermined period, regulated by a time switch, which may be adjusted to periods from 1 to 5 min. (2 min. normal). At the end of this period, the operation is automatically reversed, the hood is lifted and the units move away from the car, the gates open and another car can be run in.

The electrical equipment may be adapted to alternating or direct current and will include one 20-hp. blower motor, one 10-hp. moving motor, two

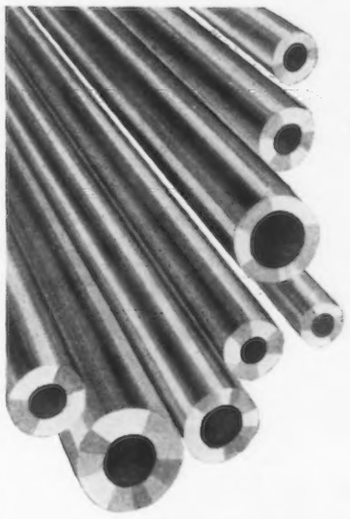


Two heating units, each complete with oil-burning furnace, and blower and ducts, are brought close to the car on opposite sides and sliding doors enclose the ends; the frozen contents are loosened usually in 2 min.

3-hp. motors, one for hood and one for air compressor, and one ½-hp. motor for oil pump. Standard equipment is designed for operation on alternating current at 440 volts, 3-phase, 60 cycles. Automatic control is provided to produce the operating cycle.

The heat ducts and heat boxes are insulated by standard rock wool insulating material approximately 4 in. thick protected by a galvanized steel covering. The heat box is divided into six sections for each unit, each section being separately insulated and capable of removal for repairs. Temperature of the outlet heat is controlled by adjustment of dampers in the oil furnace, the perforated face plates of the heat box and deflecting vanes which direct the heat downward. These vanes are adjustable so that the heat will be uniformly distributed over the entire area. Provision is also made for the complete closure of either or both of the end sections in case short cars are being thawed, thus giving effective heating service for 32, 42 or 50-ft. cars.

All products of combustion are utilized so that there are no combustion losses. Fuel tanks of sufficient capacity to provide fuel for 12 hr. of continued operation are provided on each unit. Practically no attendance is required after the burners are lighted. The units may be installed at most convenient operating points, such as at the bottom of the approach incline to a lifting car damper, or at vantage points in a load yard. When freezing conditions are aggravated a number of units may be applied so that the cars may be thawed in progressive stages or the time control can be arranged to permit continuous operations and a car allowed to remain in the heater as long as required to thaw it completely. During summer months the units may be moved to one side and stored close together.



TOOL STEEL TUBING

NON-SHRINK
OIL HARDENING
NON-DEFORMING

for RING DIES
CUTTING DIES
SPACERS, BUSHINGS, Etc.

Manufacturers of BISCO *Tungsten Carbide drawing dies for wire, rod and tubing.*

THE BISSETT STEEL CO., INC.
945 E. 67th ST. CLEVELAND, OHIO
Cincinnati Worcester Buffalo

... OBITUARY ...

ROBERT WETHERILL, founder of Robert Wetherill & Co., manufacturer of Corliss engines and other heavy machinery, died after a brief illness at his home in Chester, Pa., aged 87 years. He entered the employ of Miller & Allen, Chester, and resigned at the age of 24 to found his own business in partnership with his brother. The Wetherill company is now a part of the Sun Shipbuilding & Dry Dock Co., Philadelphia.

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SIDNEY R. RECTANUS, vice-president in charge of operations of the American Rolling Mill Co., Middletown, Ohio, died suddenly on June 21, aged 46 years. Entering the employ of the company in 1909 as a laborer in the galvanizing department, immediately after his graduation from Purdue University, Mr. Rectanus rose to the position of superintendent and in 1916 was made director of personnel relations, specializing in organization and industrial relations. When Armco began construction of the continuous sheet mill in Ashland, Ky., in 1923, he became assistant manager of the Ashland division, and later works manager. After a year as assistant to the general manager of Armco, he was elected vice-president in charge of operations on Jan 1, 1930, making his headquarters in Middletown, Ohio. Mr. Rectanus was a director of the American Management Association, a member of the American Iron and Steel Institute and numerous other technical and industrial organizations.

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WILLIAM H. WATKINS, long identified with the iron and steel industry in Cleveland, died June 18, aged 68 years. His first employment was in the plant of the old Union Rolling Mill Co. Later he became affiliated with the former Upson Nut Co. and the Bourne Fuller Co., and was for some time superintendent of the finishing mills at the Bourne Fuller plant. He was also one of the organizers and vice-president of the former Empire Steel Co. in Cleveland.

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THOMAS A. DOOLEY, for many years district manager for the American Car & Foundry Co. at St. Louis and connected with that company for 56 years, died at his home in University City, a suburb of St. Louis, at the age of 79 years. Mr. Dooley was active until he was forced to retire six months ago on account of ill health and advanced age. He is survived by his son, Thomas A., Jr., who succeeded him as district manager.

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ROBERT D. CAMPBELL, one of the founders of Allegheny Steel Co., Brackenridge, Pa., died while vacationing in Canada. He was 65 years of age. He was senior vice-president and a director of the Allegheny Steel Co.

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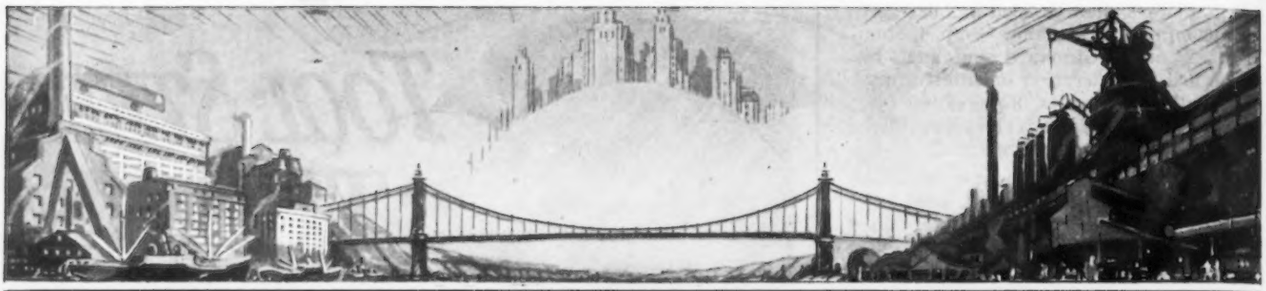
HOWARD COONLEY, JR., Buffalo district sales manager of the Walworth Co., and son of Howard Coonley, president of that company, drowned at Lake Sunapee, N. H., on June 23. He was 32 years old.

Scrap Again Weak In Detroit Area

DETROIT, June 26.—After a temporary period of firmness based solely on improved sentiment in the trade, the local scrap market has lapsed back into weakness. Prices have not changed and dealers believe that quotations probably will stay at or close to present levels in the immediate future. Steel mills are slowly cleaning up current contract commitments by authorizing deliveries of small tonnages, but dealers still have round lots of scrap tied up which eventually are to be shipped to consumers by water.



PLANT EXPANSION AND EQUIPMENT BUYING

Machine Tool Business Dull But Prospects Brighten

SEASONAL influences, combined with the slow pace of capital goods demand and the dampening effect of labor threats, have conspired to keep the machine tool business at a low level during the past week. Some plants are operating almost solely on job and repair work while others are manufacturing to stock.

Tool builders, however, now have more reason to feel optimistic regarding the future than they have had for some time. The Amalgamated's famous retreat from Pittsburgh to Washington is indicative of growing weakness of the professional labor trust. The liberalizing of the Securities Act holds promise for a gradual restoration of private investment. Both of these situations are favorable to better machine tool demand.

NORTH ATLANTIC

Solvay Process Co., 61 Broadway, New York, manufacturer of alkali and kindred industrial chemical products, main plant at Solvay, Syracuse, N. Y., has selected site at Baton Rouge, La., for new branch plant, with power house, pumping station, machine shop and other departments. Cost over $1,500,000 with equipment. Company is a subsidiary of Allied Chemical & Dye Corpn., New York.

Board of Transportation, New York, 250 Hudson Street, asks bids until July 9 for signaling and switching equipment for new city subway system along Fulton Street, Brooklyn, and other thoroughfares to West Fourth Street and Eighth Avenue, New York. This is first part of work to be carried out for new rapid transit system for which Federal loan of $28,000,000 was recently secured.

Chase Metalcraft Corpn., New York, has been organized by Oscar Richter, 325 Rich Avenue, and Maxwell Richter, 8 East Prospect Avenue, both Mount Vernon, N. Y., to manufacture metal products.

Berst-Forster-Dixfield Co., 420 Lexington Avenue, New York, manufacturer of woodenware specialties, pulp products, etc., has let general contract to James Leck Co., 211 South Eleventh Street, Minneapolis, for two-story and basement addition to mill at Cloquet, Minn. Cost close to $200,000 with equipment. Homan F. Hallock, Oswego, N. Y., is architect and engineer.

Continental Baking Co., Inc., 285 Madison Avenue, New York, has let general contract to White Construction Co., 95 Madison Avenue, for new three-story automobile service, repair and garage building, 100 x 110 ft., at Park Avenue and 166th Street. Cost about $40,000 with equipment. H. E. Hildebrand is company architect.

Harlem Metal Corpn., 594 East 133rd Street, New York, has leased site on Harlem River, near East 144th Street, owned by Central Foundry Co., for new storage and distributing plant, with elevating, conveying and other mechanical-handling equipment. Several one-story units will be built. Cost over $40,000 with equipment.

First National Oil Corpn., 29-27 Forty-first Avenue, Long Island City, has leased property fronting on East River, 185 x 510 ft., as site for new bulk oil storage and distributing plant, for which plans have been filed. Cost about $80,000 with tanks, pumping station and other units.

Durable Iron Craftsmen, Inc., Brooklyn, has been organized by Samuel M. Cirton, 231 Smith Street, and associates, to manufacture ornamental iron products.

Poundmaker Gold Mines, Ltd., care of J. P. Kirby, Port Washington, N. Y., recently organized, plans development of gold mining properties in Ontario, Canada, with installation of mining machinery, ore milling plant, storage and distributing units. Cost over $100,000 wth equipment. Financing is being arranged.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 3 for electric storage batteries (Schedule 2758) for Brooklyn and Mare Island Navy yards; six fuel oil pumps and two Diesel oil supply pumps and spare parts (Schedule 2739); four corrosion-resisting steel gasoline storage tanks (Schedule 2761) for Brooklyn and Charleston, S. C., yards.

Paramount Lamp Shade Wire Frame Co., Inc., New York, has been organized by Rudolph Micik, 35 Bond Street, and associates, to manufacture wire frames and other wire goods.

American Enameled Brick Corpn., South River, N. J., has authorized plans for rebuilding plant recently destroyed by fire, including one-story machine shop with machinery. Conveyor cars and other mechanical equipment will be installed. Cost about $350,000 with machinery. Headquarters are at 420 Lexington Avenue, New York.

Barrett-Cravens Co., 3255 West Thirtieth Street, Chicago, manufacturer of lift trucks, portable elevators, etc., has let general contract to Douglas & Hueber Co., 605 Broad Street, Newark, N. J., for new one-story Eastern branch plant at Hillside, near Newark. Cost about $25,000 with equipment. Epple & Kahrs, 17 Washington Street, Newark, are architects and engineers.

Elizabeth Brewing Corpn., 600 Pearl Street, Elizabeth, N. J., plans new power plant. Cost about $45,000 with equipment. Schwarz Laboratories, Inc., 202 East Forty-fourth Street, New York, is consulting engineer. Company is arranging for stock issue of about $280,000, part of fund to be used for expansion. Oscar L. Auf der Heide is president.

Frankford Grocery Co., Inc., Penn and Unity Streets, Philadelphia, has let general contract to Barclay White Co., 22 North Thirty-sixth Street, for new multi-story storage and distribution plant. Cost over $55,000 with mechanical-handling and other equipment.

NEW ENGLAND

New England Chemical Industries, Inc., Woburn, Mass., affiliated with Pacific Bone, Coal & Fertilizing Co., San Francisco and New York, has let general contract to Austin Co., Cleveland, for main two-story plant, 142 x 580 ft., and smaller units, on site of former works of Merrimac Chemical Co., Woburn. Cost over $200,000 with equipment. Ellison & Russell, Pacific Building, San Francisco, are architects and engineers.

Board of Selectmen, Andover, Mass., plans manual training department in new multi-story junior high school. Cost about $400,000 with equipment. P. F. Gilbert, Lowell, Mass., is architect; Kilham, Hopkins & Greeley, 126 Newbury Street, Boston, are consulting architects.

Aerodynamic Boat Corpn., Milford, Conn., has been organized by Simon Lake, 29 Broad Street, Milford, and Thomas A. E. Lake, Stratford, Conn., capital $200,000, to manufacture flying boats and parts, and other marine equipment.

Town Water Department, North Abington, Mass., plans new elevated steel tank and tower for municipal water system. Financing is being arranged. J. J. Van Valkenburgh, Irving Square, Framingham, Mass., is consulting engineer.

Draper Corpn., Hopedale, Mass., has sold part of Stafford Co. plant in Hyde Park, Mass., to United States Brass & Copper Co., which will occupy at once for manufacture of seamless brass, copper and aluminum tubes and pipe.

Coulter & McKenzie Co., Bridgeport, Conn., have plans for a machine shop to replace one recently destroyed by fire.

Bridgeport Brass Co., Bridgeport, Conn., will erect a one-story manufacturing unit, cost about $40,000 without equipment.

OHIO AND INDIANA

Midland Steel Products Co., Madison and West 106th Street, Cleveland, manufacturer of automobile equipment, parts, etc., has acquired property on Mount Elliott Avenue, Detroit, for new branch plant in near future. Cost over $125,000 with equipment.

Farmers Fertilizer Co., Windsor Avenue, Columbus, Ohio, has let general contract to E. L. Prentice, 77 East Longview Avenue, for one-story addition, 112 x 326 ft., for storage and distribution, replacing a unit recently destroyed by fire. Cost about $50,000 with equipment.

Piqua Emery Cutter & Foundry Co., Piqua, Ohio, has been organized by Charles Sheaf and Joseph Adlard, care of Bernard S. Keyt, Piqua National Bank & Trust Co., representative, to manufacture iron and steel castings and other specialties.

City Council, Elyria, Ohio, plans installation of pumping machinery and auxiliary equipment, pipe lines, fittings, etc., for extensions and improvements in municipal waterworks. Fund of $400,000 is being arranged for work.

Sailor leaping from deck of lighthouse tender to the deck of a light buoy in order to inspect lamp which requires attention twice a year.

Footwork!

Performance of duties frequently involves hazardous footwork. The light buoy is only a picturesque example chosen from many. Accident statistics make terribly plain what a difference there may be between the foot that slips and the foot that holds.

Carnegie Floor Plate contributes to both safety and efficiency at little cost. On elevated platforms, bridges, stairtreads, boiler-room and industrial floorings, and a wide range of other uses, it makes footing both secure and comfortable. Different gauges and dimensions for various uses. Inquiries invited.

CARNEGIE STEEL COMPANY

Subsidiary of United States Steel Corporation

PITTSBURGH • PENNSYLVANIA

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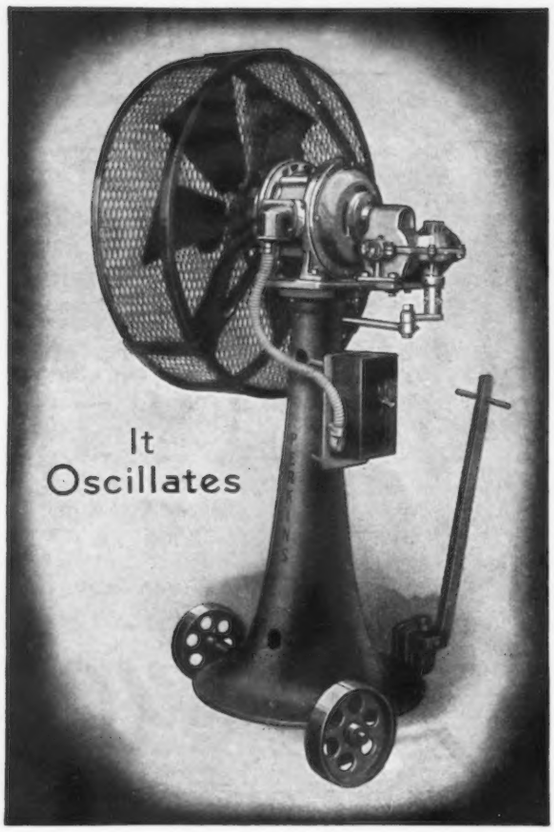
CARNEGIE FLOOR PLATE

PERKINS MAN COOLERS



Men working in hot places are made comfortable by Perkins Man Coolers. Hence increased production and lower costs. Eliminates labor turnover. Readily moved from place to place. Made in stationary as well as oscillating types.

Engineers and Manufacturers

B. F. Perkins & Son, Inc. Holyoke, Mass.

Bedford Brewing Co., Bedford, Ohio, C. F. Bruggemeier, head, is arranging for extensions and improvements in former plant of Mason Tire Co., to be converted for new brewery. Cost over $50,000 with equipment.

Lima Metal Products, Inc., Lima, Ohio, has been organized by Harold J. Meredith and Kent W. Hughes, Savings Building, capital $110,000, to manufacture metal specialties.

Kroger Grocery & Baking Co., 35 East Seventh Street, Cincinnati, will take bids on general contract early in July for two-story and basement meat-packing plant, 160 x 300 ft. Cost about $500,000 with equipment. Tietig & Lee, 34 West Sixth Street, are architects.

Indiana Breweries, Inc., 946 West New New York Street, Indianapolis, plans extensions and improvements, including new equipment. Cost close to $100,000 with machinery.

Weil Packing Co., 1700 Oakley Avenue, Evansville, Ind., meat packer, has asked bids on general contract for two-story addition, 59 x 105 ft., for new refrigeration plant. Cost about $45,000 with equipment. H. Peter Henschien, 59 East Van Buren Street, Chicago, is architect and engineer.

Morgan Steel Products, Inc., Cleveland, has been organized to make plates, conveyors, tanks, stacks and refiners' equipment. It has leased building, 80 x 126 ft., on Morgan Avenue, S. E., and plans to enlarge this with an addition. James Morgan, president and general manager, was superintendent for a number of years of former Variety Iron Works and later president-manager of Ohio Iron Works Co., Cleveland.

BUFFALO DISTRICT

Atlantic Refining Co., 260 South Broad Street, Philadelphia, has let general contract to Stewart & Bennett, Inc., 126 North Water Street, Rochester, N. Y., for new bulk oil storage and distributing plant at Rochester, including steel tanks and garage unit. Cost close to $150,000 with equipment.

Lighting Fixture Corpn. of Buffalo, Inc., Buffalo, has been organized by Willian E. R. Mitchels and Nicholas W. Ball, 123 West Chippewa Street, to manufacture lighting fixtures and kindred equipment.

New Process Gear Co., Inc., 500 Plum Street, Syracuse, N. Y., manufacturer of automobile gears, transmissions, etc., in receivership for several months, has been acquired at a sale in combined mortgage foreclosure and equity proceedings by Probon Corpn. of Delaware, Franklin Benkard, vice-president, for $200,100.

Provincial Paper, Ltd., 74 University Avenue, Toronto, Ont., is considering addition to paper and pulp mill at Port Arthur, Ont. Cost over $100,000 with equipment.

WASHINGTON DISTRICT

City Council, Danville, Va., will take bids soon for equipment for extensions in municipal electrical distribution system; also for waterworks expansion, including pumping machinery, pipe lines, etc. E. C. Brantley, manager, Water, Gas and Electric Department, in charge

Workers Aircraft & Mfg. Corpn., 244 South Highland Avenue, Baltimore, has been organized by George M. Berry, Reckord Building, Towson, Md., and associates, to manufacture airplanes and parts.

Distillers Corpn.-Seagrams, Ltd., Montreal, Que., has arranged for additional stock issue of 242,639 shares, no par value, of which 70,016 shares will be used for acquisition of Maryland Distillery, Inc., Relay, near Baltimore, and expansion for new branch distillery. Remainder of shares will be used for similar purpose in connection with new distilling plant at Lawrenceburg, Ind., lately purchased.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until July 3 for non-metallic gasoline hose (Schedule 2756) for Sewall's Point, Va., San Diego and Mare Island Navy yards; until July 6, corrosion-resisting steel valves (Schedule 2746) for various navy yards.

Board of Trustes, University of Virginia, Charlottesville, Va., has let general contract to North-Eastern Construction Co., Winston-Salem, N. C., for new multi-story engineering building. Cost $265,000 with equipment. Federal financing has been arranged.

SOUTH ATLANTIC

American Consolidated Tin Mines Corpn., 120 Liberty Street, New York, has asked bids on general contract for tin ore milling plant near Lincolnton, N. C., with power house, machine shop and other mechanical departments. Mining, hoisting, conveying, loading and other machinery will be installed. Cost over $150,000 with equipment.

Gigis Boat Building & Engine Co., Fernandina, Fla., has been organized by George and Paul Gigis, Fernandina, to manufacture boats, marine engines, parts, etc.

Anderson Gas & Utilities Co., Anderson and Greenwood, S. C., has been acquired by new interests, headed by M. D. Lucas, Florence, S. C., and associates. New owners plan extensions and improvements, including pipe line additions.

Port Terminal Commission, Morehead City, N. C., has engaged Watts Carr, Durham, N. C., consulting engineer, to prepare plans and supervise construction of new port terminal, to include loading and distribution facilities, elevating, conveying and other mechanical equipment. Fund of $400,000 has been arranged.

Pepperell Mfg. Co., Lindale, Ga., has let general contract to Batson-Cook Co., West Point, Ga., for three-story addition to cotton mill, 50 x 325 ft. Cost about $100,000 with equipment.

SOUTH CENTRAL

Edison General Electric Appliance Co., 5600 Taylor Street, Chicago, subsidiary of General Electric Co., Schenectady, plans establishment of new branch plant at Chattanooga, Tenn., for production of Hotpoint electric specialties, electric water heaters, etc., to be sold under consumer program of Tennessee Valley Authority, Knoxville, Tenn. Company has contracted with Hedges-Walsh-Weidner Co., Chattanooga, manufacturer of boilers,

THE chemical content of pig iron depends upon type or mixture of ores used. The extent and variety of Interlake Iron Corporation's high grade ore reserves in Minnesota and Northern Michigan assure uniform analysis of pig iron of any desired specification.

PIG IRON . . *All Grades*

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COKE

tanks, etc., for manufacture of boiler units for water heaters.

Common Council, Sylacauga, Ala., asks bids until July 9 for 250,000-gal. steel tank, pipe lines and other equipment for municipal water system. Wiedeman & Singleton, Candler Building, Atlanta, Ga., are consulting engineers.

Sunny Brook Distillery, Twenty-eighth Street and Broadway, Louisville, has filed plans for one-story vat and tank house. Cost over $25,000 with equipment.

Nugent Sand Co., Louisville, plans replacement of derrick boat, barges, tugboat, terminal loading and conveying machinery, and other handling equipment recently destroyed by fire. Loss about $80,000.

Town Council, Mendenhall, Miss., asks bids until July 3 for transformers and accessory equipment for municipal power service.

Board of Public Works, Nashville, Tenn., has plans for new municipal incinerator, with furnaces, stokers, conveyors, loaders and other equipment. Fund of $100,000 has been arranged. It is proposed to begin work in July.

Kennebec Distillery, Frankford, Ky., care of Carl J. Kiefer, Schmidt Building, Cincinnati, consulting engineer, has taken bids on general contract for extensions and improvements. Cost over $150,000 with equipment.

WESTERN PENNA.

Joseph S. Finch Co., Schenley, Pa., distiller, has asked bids on general contract for 10-story addition for storage and distribution. Cost over $150,000 with equipment. Carl J. Kiefer, Schmidt Building, Cincinnati, is consulting engineer.

Fort Pitt Brewing Co., Sharpsburg, Pa., has approved plans for additions and improvements in present works. Equipment will be installed to double present capacity of brewhouse and bottling works. Cost about $200,000 with machinery.

Postmaster General, Post Office Department, Washington, has been authorized by House Post Office Committee to arrange fund of $650,000 from PWA for new plant at Reedsville, W. Va., for manufacture of metal furniture, lockers, cases and other post office equipment. Bids scheduled to be asked soon.

United States Bureau of Mines, Forbes Street, Pittsburgh, has asked bids on general contract through Lawrence Wolfe, Grant Building, architect, for new equipment storage and distributing warehouse. Cost about $100,000 with equipment.

SOUTHWEST

Board of Education, Library Building, Kansas City, Kan., plans early call for bids on general contract for new three-story and basement high school, to include manual training department. Fund of $1,800,000 has been arranged. Hamilton, Fellows & Nedved, Tower Court, Chicago, are architects; Joseph W. Radotinsky, Commercial National Bank Building, Kansas City, Kan., is associate architect.

R. L. Jackson, Guymon, Okla., is at head of project to build a new carbon black plant near city. Cost over $40,000 with air compressors, pipe lines and other equipment. Company will be organized to carry out project.

Griffin Wheel Co., Twelfth Street and Belt Line Railway, Kansas City, Kan., manufacturer of car wheels, plans replacement of equipment, including crane, recently damaged by fire. A. O. Niles is plant superintendent.

City Council, Moberly, Mo., has called special election, Sept. 11 (postponed from earlier date, to approve bonds for $566,000 of a gross fund of $700,000 to be used for municipal electric light and power plant addition, including new operating unit with turbo-generators, boilers and accessory equipment. Russell & Axon, 4903 Delmar Boulevard, St. Louis, are consulting engineers.

Supervising Engineer, Indian Irrigation Service, Albuquerque, N. M., asks bids until July 2 for hydraulic turbine and governor, with accessory equipment, and electric generator, exciter, switchboard and auxiliaries for Mescalero generating station.

Bayless Consolidated School District, Gardenville, Mo., plans manual training equipment in new two-story and basement junior high school, for which bids will soon be asked on general contract. Cost about $140,000. Marcel Boulicault, 411 North Seventh Street, St. Louis, is architect.

Corpus Christi Refining Co., Corpus Christi, Tex., J. F. Whitehurst, general manager, has begun work on first of three units of new gasoline refinery at Every Point, near city limits. Two additional units of similar size will be built soon. Entire project will cost close to $300,000 with machinery, including tank storage and distribution facilities. Company was formed recently as a joint interest of Taylor Refining Co., Taylor, Tex., and Alamo Refining Co., Willow Springs, Tex.

MIDDLE WEST

Miles Equipment Co., Sycamore, Ill., manufacturer of automobile axles, parts, etc., plans rebuilding part of plant recently destroyed by fire. Loss about $75,000 with equipment.

California Standard Gold Mines Corpn., 208 South La Salle Street, Chicago, A. Young, secretary-treasurer, is arranging for sale of stock totaling about $300,000, considerable part of fund to be used for development of gold-mining properties in Tuolumne County, Cal., installation of mining machinery, ore mill equipment, etc.

Filshie Lead Head Nail Co., Chicago, has been organized by John M. Upton, Jay Kaplan and associates, to manufacture special hardware products. New organization will take over company of same name at 5801 South State Street.

Schutz & Hilgers Jordan Brewery, Inc., Jordan, Minn., plans new one and two-story bottling plant. Cost about $25,000 with equipment. Wesley G. Wells, 1455 Edmund Street, St. Paul, Minn., is architect.

Board of Vocational Education, Beloit, Wis., plans two-story addition, 34 x 85 ft., to vocational training school. Otto A. Merman, Gateway City Bank Building, La Crosse, Wis., is architect.

Grigsby-Grunow Co., 5801 Dickens Avenue, Chicago, Edmund D. Addock, referee in bankruptcy, manufacturer of radio equipment and parts, electric refrigerators, will soon be offered at a public sale, including plant and property, machinery, etc. Frank Mackey is trustee in bankruptcy.

Wisconsin Steam Corpn., Eau Claire, Wis., Sidney P. Hall, 335 McKinley Avenue, vice-president and manager, recently organized, is planning new central steam power plant, with pipe lines for central heating. Application has been made for franchise. Cost about $200,000 with distributing facilities. Albert W. Buell, 363 South Snelling Street, St. Paul, Minn., is consulting engineer.

Anchor Mountain Mining Co., Deadwood, S. D., Thomas Houlette, president, operating gold-mining properties in Black Hills district, S. D., is arranging for sale of stock totaling about $216,000, portion of fund to be used for development of properties and equipment installation.

PACIFIC COAST

Weiland Brewing Co., 240 Second Street, San Francisco, has taken bids on general contract for extensions and improvements in brew-house, bottling department, barrel and keg house, and storage and distribution buildings. New equipment will be installed. Cost about $150,000 with machinery. Herman Noethit, address noted, is company engineer.

Golden State Cannery, Isleton (Sacramento County), Cal., is planning to rebuild canning plant recently destroyed by fire. Loss over $100,000 with equipment.

Western Oil Well Supply Co., Los Angeles, has been organized by Jack Herley and Paul Kelley, Long Beach, Cal., care of Burke & Ball, Insurance Exchange Building, Long Beach, representative, capital $100,000, to manufacture oil well drilling equipment, oil rig specialties and kindred mechanical equipment.

Analy Union High School District, Sebastopol, Cal., plans manual training department in new two-story high school. Cost about $190,000. Financing is being arranged. Louis Stone, 354 Hobart Street, Oakland, Cal., is architect.

Donlevy Distilling Corpn., San Diego, Cal., John C. Donlevy, treasurer, is arranging for stock issue of $1,250,000, considerable portion of fund to be used for new distillery, equipment, storage and distribution facilities, etc. Company has a controlling interest in Destileria De Tecate, S. A., operating a distillery at Mexicali, Baja California, Mexico. William C. Allen is president.

Riverside Walnut Growers' Association, Riverside, Cal., has awarded general contract to W. P. Wiest & Co., 4338 Beatty Drive, for one-story and basement packing plant, 75 x 110 ft., to replace unit destroyed by fire. Cost close to $45,000 with equipment, including bins, conveyors, loaders and other mechanical-handling equipment. Albert C. Martin, Higgins Building, Los Angeles, is archi-

MICHIGAN DISTRICT

Modern Brewing Co., Grand Rapids, Mich., recently organized, care of George J. Fuchs, 2985 Fischer Street, Detroit, architect, has authorized plans for four-story and basement brewing plant on Mount Vernon Avenue. Cost about $175,000 with machinery. Company has arranged for stock issue to total about $269,000, portion of fund to be used for purpose noted. L. Fred Peabody is president, and Louis D. Mehrtens, secretary, both of Grand Rapids.

R. Cummins Co., Louisville, distiller, has awarded general contract to Conrad Keller Co., 4628 Moran Street, Detroit, for extensions and improvements in former factory at Battle Creek, Mich., for new distillery. Cost about $65,000 with machinery.

Vacuum Controlled Carburetor Co., Detroit, has been organized by Sidney A. Erwin, 1220 Free Press Building, and associates, to manufacture carburetors, parts and kindred automotive equipment.

Lansing Brewing Co., Lansing, Mich., has let general contract to Reniger Construction Co., Lansing, for extensions and improvements in former factory of Auto Body Co., to be converted for new brewery. Cost about $100,000 with equipment. Mildner & Eisen, Hammond Building, Detroit, are architects.

FOREIGN

British Farina & Dextrine Co., Ltd., March, near Isle of Ely, England, recently organized, has acquired site and plans early erection of new mill for production of starch products, dextrine, etc., to include pumping plant, power house, machine shop and other departments. Cost about £120,000 (approximately $600,000) with machinery.

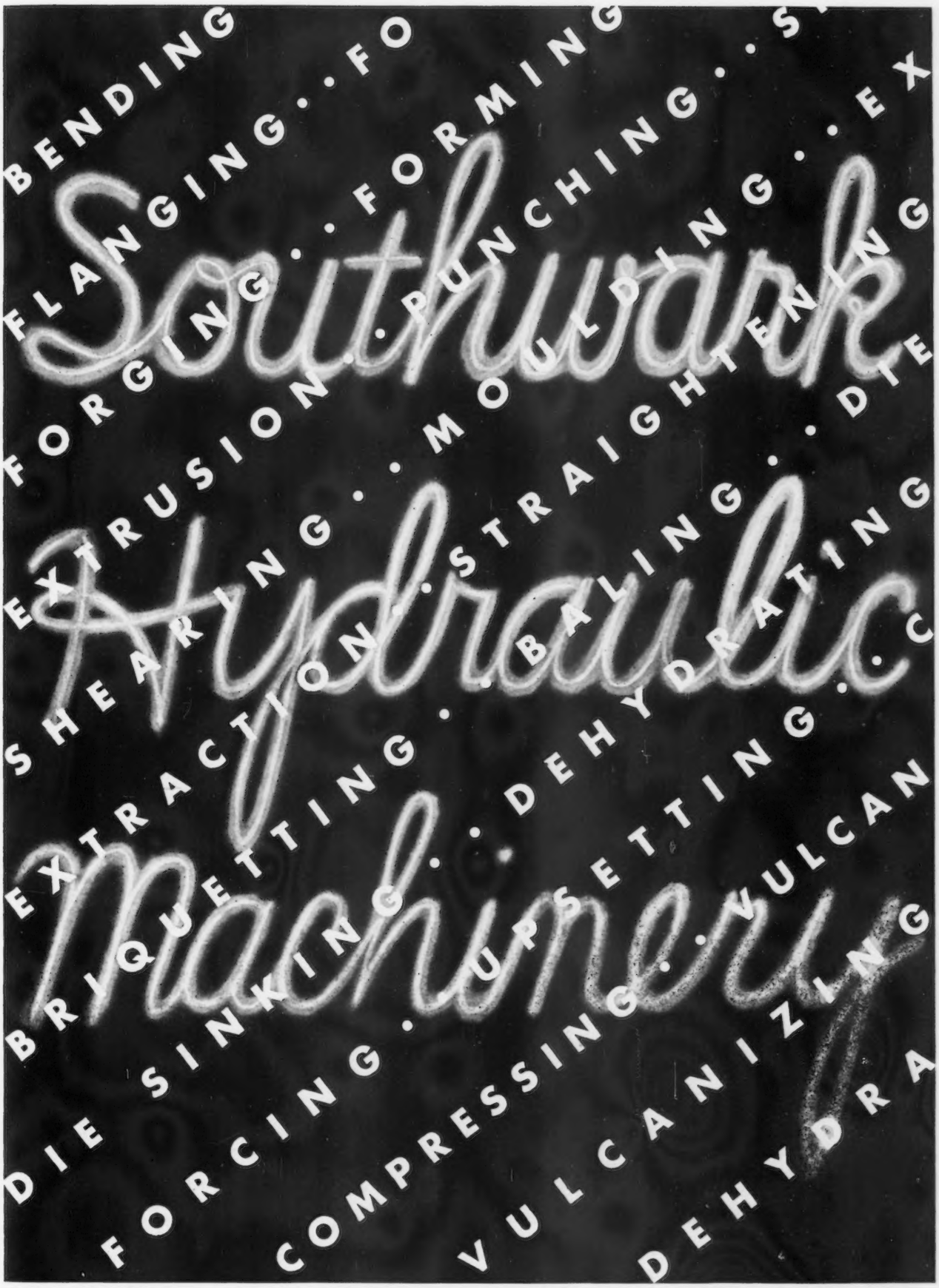
Indian Railway Administration, Delhi, India, plans early erection of new locomotive and car works near Tatanagar, India, with machine shops, foundry, wheel shop, woodworking plant, engine house, power station and other buildings. Cost over $1,000,000 with equipment.

Standard Oil Co. of New Jersey, 26 Broadway, New York, has authorized new oil refinery on island of Aruba, off coast of Venezuela, South America, with power house, oil storage and distributing facilities, pumping stations, etc., scheduled for completion in about 18 months. Cost over $1,500,000 with equipment. Award for portion of refinery machinery has just been let to Foster-Wheeler Corpn., 165 Broadway, New York.

The Louis Allis Co., Milwaukee, has opened a direct factory branch office in Atlanta, Ga., in charge of George C. Gardner, who will furnish complete engineering and manufacturing service.

National Wire & Steel Co., formerly located at 3242 Carroll Avenue, Chicago, has moved to larger quarters at 2445 North Keeler Avenue. New warehouse comprises 30,000 sq. ft. of floor space. Principal lines are steel wire, bars, steel balls, music wire and nails.

Giern & Anholtt Tool Co., Detroit, Mich., manufacturer of special tools and a complete line of tungsten carbide boring tools, has been formed to succeed National Boring Tool Co., the latter's entire assets and good will having been purchased by former and continued as heretofore. James B. Giern is president and A. P. Anholtt, vice-president and secretary.

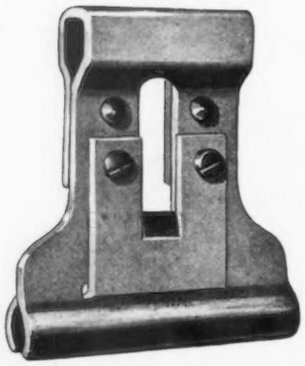


BALDWIN-SOUTHWARK CORPORATION, PHILADELPHIA

Pacific Coast Representatives: The Pelton Water Wheel Co., San Francisco

Cleveland Tramrail is Safe

Cleveland Tramrail suspension fittings, i. e., rail clamps, couplings, alloy steel hanger rods, ceiling fittings, have a safety factor of five (5) or more at 2,000 pounds working load.



Cleveland Tramrail
Arch Beam rail for long spans or where it is not practical to suspend Tramrail from superstructure.

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CLEVELAND TRAMRAIL

Hand or Electric
Overhead Materials
Transportation Equipment

DIVISION OF
THE CLEVELAND CRANE & ENGINEERING CO.
WICKLIFFE OHIO

Sprays Metal to Repair Cavitation Damage

(Concluded from Page 15)

Not much action can be seen on this metal, all material is in place and looks very good.

No. 12 bucket metallized with lead. Found about 20 per cent of the lead left, the rest has all been washed away.

No. 13 bucket metallized with stainless steel. This looks very good—found a small hole in this metal approximately ¼ x 1 x 2 in.

No. 14 bucket metallized with high carbon steel. Little water action shown, but looks very good, found small hole on the bottom edge approximately ⅜ x 1 x 1½ in.

The results of the test were taken to indicate that for repairing cavitation in cast iron buckets stainless steel, high carbon steel, copper or bronze should be used; that the lower melting point metals, namely, zinc, aluminum and lead, were rapidly eaten away and should not be used. Also it was found that the sprayed metal was not loosened or pulled away from the base material.

The cost of the repair work per bucket was estimated as follows, including both material and labor but not overhead: Stainless steel, $12.50; high carbon steel, $9.50; bronze, $3.90, and copper, $3.50. These costs were predicated on badly cavitated buckets, so that it was estimated that if the buckets were repaired each year, the cost of keeping them in condition would be about as follows per bucket: Stainless steel, $2.80; high carbon steel, $2.20; bronze, $1.10, and copper, 80c.

Bucket No.	Metal	Wt. of Wire Used in lb.	Spraying Time, Min.	Acetylene, Cu. Ft.	Oxygen, Cu. Ft.
2	Zinc	4	35	8	9
3	Bronze	5¼	125	32	37
6	Aluminum	3	130	33	38
11	Copper	6½	140	35	41
12	Lead	8	35	8	9
13	Stainless Steel	2½	140	35	41
14	High Carbon Steel	3½	185	47	57

Ford Blast Furnace In England Blown in

C. E. SORENSEN, a director of the Ford Motor Co., recently officiated at the blowing in of the large blast furnace erected by the company at its new works at Dagenham, England. With the completion of this furnace, which is the first to be erected in the South of England, the company has almost realized its aim to feed the factory with its own raw materials. Hitherto all British steel plants have been located in central and northern England.

Now a Scientifically Designed
VENTILATING FAN THAT MEETS EVERY TEST

Before you buy a new Ventilating Fan for your store, office, factory, shop, garage, theatre or restaurant be sure that you see this new Ventura Ventilator.

Inspect its streamline ring (Fig. 1). It serves as both fan inlet and discharge outlet. It is the result of years of practical experience and research by American Blower Engineers. You can literally see how air, in great quantities, passes through this fan in an unbroken column with the minimum power.

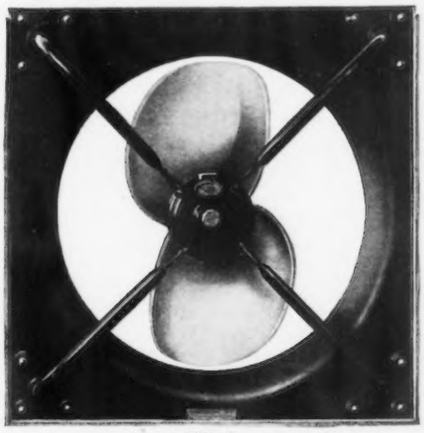


FIG. 1

Then look at the fan blades (Fig. 2). Why, they're different! But they give an immediate impression of handling a lot of air—and tests prove it!

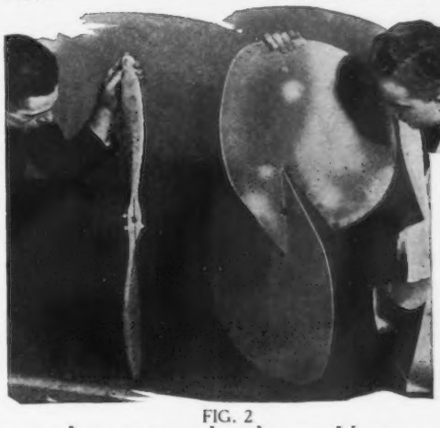


FIG. 2

Compare the new Ventura Fan Wheel (Figs. 2 and 3) with any other type you've ever seen and you'll know it's right.

Tests conducted in accordance with the Standard Test Code of the American Society of Heating & Ventilating Engineers demonstrate that the new Ventura Fan is so superior there just isn't any question. Compare your total installed cost for these new square plate fans with circular frame fans. From the cost standpoint alone you will find you are dollars and cents ahead, to say nothing of the extra air handled. Glance over the power consumption figures on tests run according to the standard practice of the American Society of Heating & Ventilating Engineers and you'll immediately see that, for the amount of air handled, comparisons do not exist for this fan.

Quietness in operation, too, is a factor. You've heard ordinary fans and that's "enough said," but wait till you hear this one run (Figs. 4 and 5). Operating at top speed it is actually as quiet as a small sailboat slipping through the evening breeze.

FIG. 3

Measure it against fans of many more blades (Fig. 3), and you'll find the same results—greater capacity, lower power consumption and quieter operation.

Look at it from the standpoint of vibration (Fig. 1). The motor is quiet operating, spring suspension mounted (patented feature), the conduit is flexible, to preserve the resilient motor mounting, and the motor supports are of sturdy round seamless-steel tubing—all combining to prevent any drumming effect.

FIG. 4

What a difference it will make in all places of business by removing bad air, greasy smoke, excessive heat and bringing in fresh, healthful air.

AMERICAN BLOWER CORPORATION, DETROIT, MICHIGAN
CANADIAN SIROCCO CO., LIMITED, WINDSOR, ONTARIO
BRANCH OFFICES IN ALL PRINCIPAL CITIES
Division of American Radiator and Standard Sanitary Corporation

FIG. 5

American Blower
VENTILATING, HEATING, AIR CONDITIONING, DRYING, MECHANICAL DRAFT
DIVISION OF AMERICAN RADIATOR and STANDARD SANITARY CORP.

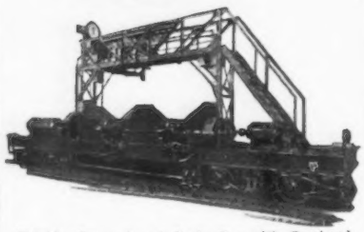
AMERICAN BLOWER CORPORATION, 6000 Russell Street, Detroit, Mich.
BRANCH OFFICES IN ALL PRINCIPAL CITIES

Please send data on new Ventura Fans.

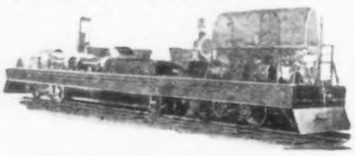
*Name*_____ *Address*_____

*City*_____ *State*_____ (1306)

ATLAS CARS



Double Compartment Scale Car with Overhead Operator's Platform. Car provided with Orr Bin Gate Operating Mechanism.



20 Ton Capacity Double Compartment Scale Car for use with Orr type Bin Gates controlled from Operator's Station on Scale Car.

Atlas Products

Gas-Electric and Diesel-Electric Locomotives

Electric Transfer Cars for Blast Furnaces and Steel Plants

Stockhouse Scale Cars for Blast Furnaces

Concentrate and Calcine Cars for Copper Refineries

Automatic and Remote Controlled Electric Cars

Pushers, Levellers and Door Extractors

Coal Charging Lorries, Coke Guides and Clay Carriers

Atlas Patented Coke Quenching Cars for By-Product Coke Ovens

Atlas Patented Indicating and Recording Scales

Special Cars and Electrically Operated Cars for every conceivable purpose.

THE ATLAS CAR & MFG. CO.
Engineers - Manufacturers
1140 Ivanhoe Rd., Cleveland, O.

Broad British Studies Of Corrosion Problems

(Concluded from Page 20)

A large proportion of the committee's work is devoted to tests on painted specimens, which are painted in one of two standard ways—with red lead followed by red oxide or with red oxide only. These paints are applied to the specimens in several surface conditions, including the as-rolled condition with different types of scale, and the same conditions after exposure to weathering for several weeks, so that a mixture of scale and rust is usually obtained on the surface—this is a very important surface condition from the practical point of view, since most structural steelwork is in this state when painted. Tests are also made on painted specimens that have been thoroughly descaled by picking and sandblasting prior to painting.

A third series of tests will shortly be begun on a number of high-tensile steels, chiefly of the copper-chromium type, having a chromium content of up to 1 per cent; the necessary casts have already been made under the usual conditions as regards observation during manufacture.

The report details conclusions from early observations of the field tests, covering specimens in the as-rolled, descaled and painted condition. A section of the report is devoted to marine corrosion, a large part is taken up with discussion of material in actual service conditions, some 90 pages comprise a number of monographs on laboratory tests and there is a summary of papers, memoranda and other information submitted to the committee.

Careful Heat Treatment Used for Airplane Steel

RECENT tests at the Bureau of Standards have indicated that internal stresses set up by rolling in 1050 carbon steel tie rods for airplanes can be practically eliminated by a 30-min. heat treatment at 600 to 700 deg. F. The heat treatment does not impair the mechanical properties to any appreciable extent. For stainless steel tie rods, about 50 per cent of the internal stress can be removed by heating 30 min. at 900 deg. F. This treatment generally improves the mechanical properties. It is imperative that the temperature be controlled carefully so that it does not exceed 900 deg., in order that the corrosion resistance is not lowered. In general, a stabilizer such as titanium or columbium can be used to an advantage to permit the use of higher temperatures without a decrease in resistance.

Manufacturing Activity Declined in May

MANUFACTURING activity, as measured by total man-hours worked, declined 0.8 per cent in May from April, but total payroll disbursements increased 0.2 per cent and the total number of persons at work increased 1.1 per cent, according to the regular monthly survey of the National Industrial Conference Board.

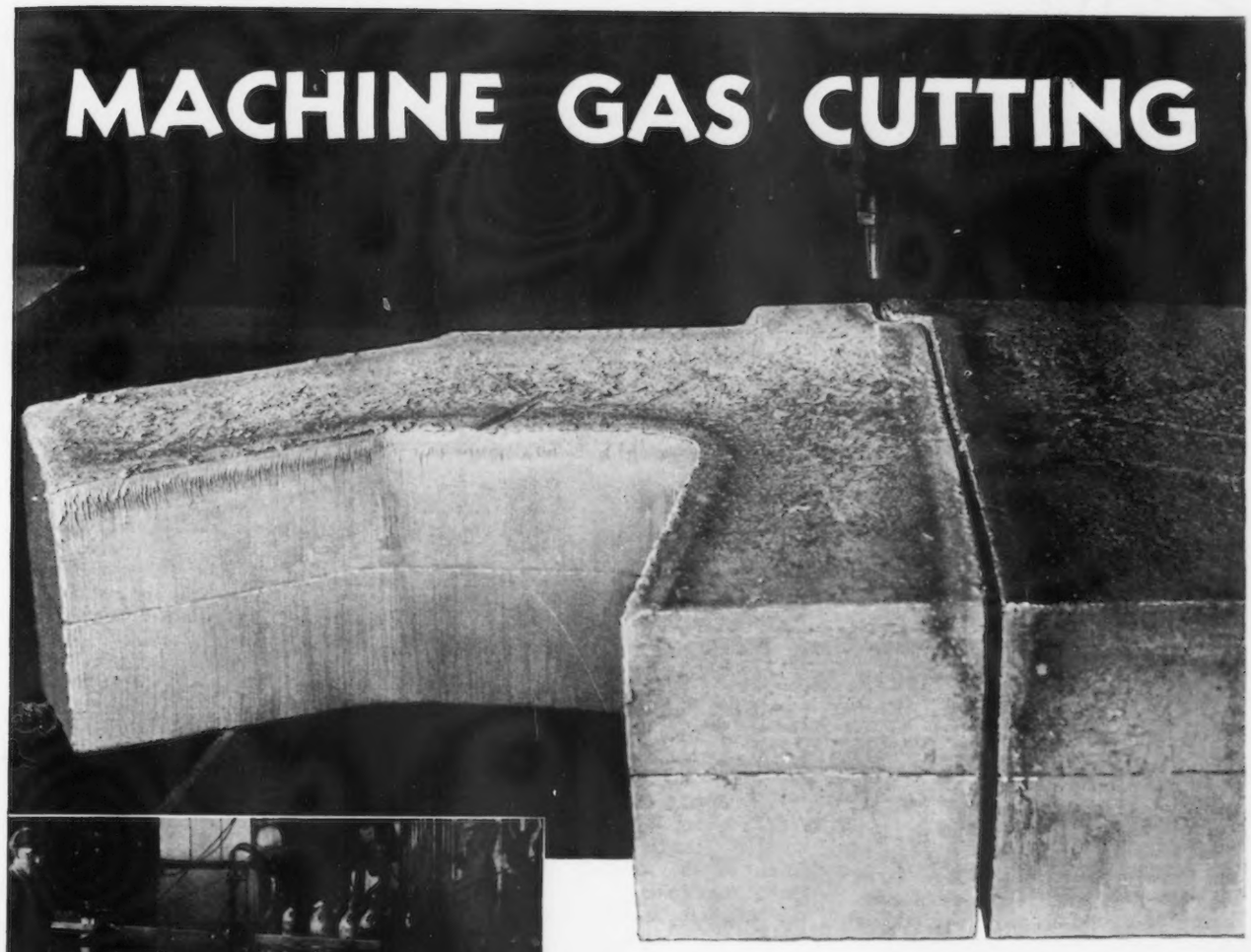
Average hourly earnings rose from 57.9c. in April to 58.7c. in May, or 1.4 per cent. A decline in the average number of hours of work per week, however, from 36.1 hr. in April to 35.4 hr. in May, or 1.9 per cent, lowered average weekly earnings from $21 to $20.81, or 0.9 per cent, during the same period. The decline in actual weekly earnings, together with a rise of 0.3 per cent in the cost of living of wage-earners, made real weekly earnings 1.1 per cent lower in May than in April.

The number of wage-earners increased 1.1 per cent from April to May. Total man-hours worked, however, fell off 0.8 per cent because of the reduction in the average workweek per wage-earner.

Although total man-hours in the combined industries declined, there were a number of industries in which increases in man-hours were recorded. These industries were paint and varnish, iron and steel, meat packing, heavy equipment, book and job printing, lumber and millwork, electrical manufacturing, machines and machine tools, hardware and small parts, leather tanning, paper and pulp, foundries, and paper products. The increases ranged in the order named from 12.1 per cent in the paint and varnish industry to 0.4 per cent in the manufacture of paper products.

MEANS for determining the iron-manganese-silicon proportions necessary to produce an alloy of a certain carbon content when quenched from a definite temperature are provided in a report of investigations, No. 3230, by Dr. C. H. Herty, Jr., and M. B. Royer, issued by the United States Bureau of Mines. The tables included, it is pointed out, may be used by the blast-furnace operator to predict the carbon content of the metal under certain conditions of temperature and of manganese and silicon content.

MACHINE GAS CUTTING



From two steel slabs forged together, this engine frame part is cut on an AIRCO OXYGRAPH in a fraction of the time it could be made by any other method and at a fraction of the cost.

AIR REDUCTION SALES COMPANY

General Offices: 60 East 42nd St.
NEW YORK, N. Y.

DISTRICT OFFICES AND DISTRIBUTING STATIONS IN PRINCIPAL CITIES

. . . the great time and money saver

MACHINE GAS CUTTING, with its remarkable speed, range and versatility, has revolutionized the design and manufacture of ferrous metal products of every description. Today, every metal working plant, large or small, can capitalize the tremendous economic benefits of the process. AIRCO'S complete line of gas cutting machines makes this possible.

EXECUTIVES of metal working plants are invited to write for the MACHINE GAS CUTTING BOOK, our recently published, profusely illustrated 92-page work which gives full details about the process and machines. It makes clear the range and scope and time-saving possibilities of MACHINE GAS CUTTING.

PIONEERS IN DEVELOPING OXYACETYLENE CUTTING PRACTICE AND MACHINES

Code Doings and Undoings

(Concluded from page 45)

must be submitted to Deputy Administrator K. J. Ammerman, Room 4315, Department of Commerce Building, Washington, prior to Thursday, July 5, 1934.

Farmers Exempted from Construction Code

FARMERS and farm organizations will be able to continue to erect their own barns and other buildings without worrying about the provisions of the construction code. A special Administration Order has just been issued in their behalf. However, their workmen must be their regular help and family members and the "project" must be "used as a direct and integral part of farm operations." In defining "regular employee," the order permits other farmers who serve without pay to join in the "barn raisin'," or whatever the enterprise may be.

Special Investigator Named for Copper Industry

John G. Barry, a mining engineer and geologist of El Paso, Tex., has been appointed as a special investigator for the copper industry. Under the terms of the copper code, members of the industry are required to report to the code authority any action taken in connection with the required averaging of the 40-hr. week over three-month periods and the administrator is empowered to appoint a special investigator to contact both employers and employees and review conditions in the industry with regard to the limitation of hours and its observance.

Dutton Administration Member of M.A.P.I. Code

Administrator Johnson has announced the appointment of Henry P. Dutton, professor of factory management in the school of commerce, Northwestern University, as administration member of the basic code authority for the machinery and allied products industry.

Hearing on Foundry Cost System

A hearing on a proposed uniform cost and estimating system as called for by the approved code for the gray iron foundry industry and submitted by the code authority, will be held by Deputy Administrator J. G. Cowling, July 6, in room 2062 of the Commerce building. Copies of the code authority's proposals are available in room 4023 of the Commerce building.

Oxy-Acetylene Code Budget

The code authority of the oxy-acetylene industry has submitted for approval a budget for the expense of maintenance of the code and a plan of contribution by its members. The budget calls for an expenditure of $37,550 for the period from May 1, 1934, to April 30, 1935. The basis of assessment is one-third of 1 per cent of the dollar volume of each member of the industry, payable either in total or quarterly in advance as the member may elect. The minimum assessment is $10. Notice is given that any criticism concerning the budget or basis of contribution must be filed with Deputy Administrator Josepf F. Battley, room 4525, Department of Commerce building, Washington, prior to July 5, 1934.

Financing of Alloy Casting Code

Deputy Administrator J. G. Cowling has announced that all criticisms regarding the plan of financing administration of the alloy casting code, as proposed by the code authority, should be submitted to him in room 4023 of the Commerce building prior to July 6. The proposals include amendments to the code providing for the submission of a proposed budget and schedule of contributions, to the administrator for his approval, request for exemption from the provisions of executive order X-36 which releases industries from the necessity of contributing to the support of any code except that under which their principal products are manufactured, and the budget. Designed to cover the 12 months starting with Feb. 4, 1934, the budget totals $20,322.50 which is figured as eight-tenths of one per cent of the 1933 sales of the industry which totals $2,548,059.26. In asking for exemption from X-36, the code authority points out that the industry consists of 11 companies whose entire output is under this code and 32 companies whose major operation is the manufacture of steel castings.

"Among those who are entirely in the alloy business," the petition continues, "are several companies who are the pioneers of this industry and who have spent a tremendous amount of money to date to bring alloy castings to their present efficiency. Inasmuch as this is a young industry, with a sales potentiality of approximately 800 per cent more than last year's sales, it offers a very attractive field for companies in the steel casting industry, who by virtue of their large surpluses and reciprocity could, if they so desired, undermine the business of the other companies whose activities are entirely in the alloy field. This is keenly felt by the alloy manufacturers and inasmuch as the 32 companies above referred to, did last year approximately 55 per cent of the dollars volume of the business sold, it does not seem logical that the 11 companies should stand the total expense of administering the code."

Permanent Code Authority for M.A.P.I.

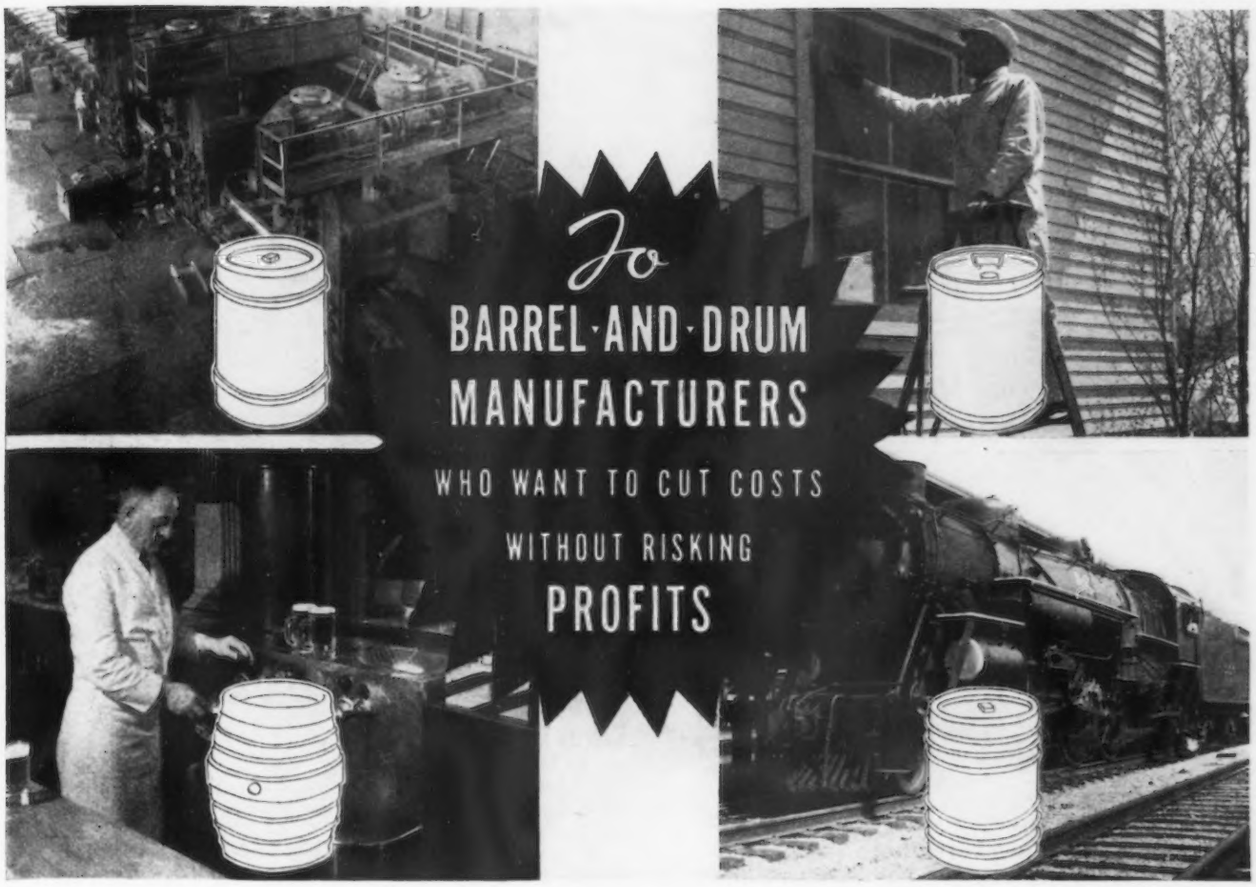
NATIONAL RECOVERY ADMINISTRATOR HUGH S. JOHNSON, it was announced today, has approved the method of selection and recognized the personnel of the permanent basic code authority for the machinery and allied products industry.

The members are:—W. S. Shipley, president, York Ice Machinery Corpn., York, Pa.; W. C. Dickerman, president, American Locomotive Co., New York; Leo W. Grothaus, assistant to the president, Allis-Chalmers Manufacturing Co., Milwaukee; Paul C. De Wolf, vice-president, Brown & Sharpe Manufacturing Co., Providence; P. C. Brooks, executive vice-president, Fairbanks, Morse & Co., Chicago; George P. Torrence, president, Link-Belt Co., Chicago; N. W. Pickering, president, Farrel-Birmingham Co., Ansonia, Conn.; Robert E. Friend, president, Bordberg Manufacturing Co., Milwaukee; George H. Houston, president, Baldwin Locomotive Works, Philadelphia; A. M. Mattison, president, Mattison Machine Works, Rockford, Ill.; Guy A. Wainwright, president, Diamond Chain Manufacturing Co., Indianapolis., and Denis F. O'Brien, president, A. P. Smith Manufacturing Co., East Orange, N. J.

CATERPILLAR TRACTOR CO. reports May net profit at $502,584 compared with $366,916 the preceding month. For the five months net profit totaled $1,666,977 equal to 88 cents a share on the capital stock.

THE Colorado Fuel & Iron Co., which went into receivership in August, 1933, on petition of the Bankers Trust Co., New York, is rapidly developing a reorganization plan which may be announced within a short time. The fact that holders of the company's first mortgage bonds are accepting payment of interest defaulted last August, is simplifying the problem of the receiver Arthur Roeder, former president of the corporation.

The Ajax Electrothermic Corpn., Philadelphia, maker of coreless induction melting furnaces, has had a large increase in installations throughout the world during the past four years. Recent installations include a 300 kw. melting furnace for the United States Navy Yard at Washingon. This furnace brings the total power used by Ajax equipments in this country to over 14,000 kw. and the world total to over 43,000 kw., representing a 19,000-kw. increase since January, 1931.



WHY assurance of lowered costs and greater profits when you use ARMCO Hot-Rolled Sheets for barrels and drums? Simply this: when the first crude "packages" were designed years ago, special ARMCO sheets filled the need economically for manufacturers. And as time wore on and containers were improved, ARMCO kept step—produced sheets inexpensive to fabricate tightly and that proved durable in service.

What They Do for You

Today you can buy iron or steel sheets from ARMCO that form easily and weld strongly; sheets that *take* and *hold* whatever coating you prefer for your barrels and drums; sturdy, tough sheets that absorb hard bumps and knocks without failing before their time.

Add the profits you make from satisfied customers to the savings you realize from easy-working, sure-welding ARMCO sheets, and your course is clear. Deliveries won't worry you, either; for ARMCO-invented continuous mills not only turn out good, uniform sheets and strip but turn them out on time the way you want them.

Bring Your Problems to ARMCO

Whatever you make—drums for oils, grease, alcohol and paint, or barrels for beer and other purposes—we can help you save in manufacture, and profit more in repeat sales. Just call in an experienced ARMCO MAN and tell him what you want to do. You can reach him quickly at the address below.

THE AMERICAN ROLLING MILL COMPANY

Executive Offices: Middletown, Ohio

District Offices in All Key Cities

ARMCO

ARMCO
means GOOD IRON AND STEEL

You don't dare ignore these three Racketeers!

Wear, weather and corrosion take a terrific toll from buildings everywhere. None can completely escape this loss. But you can minimize the ravages of these three destructive forces by using GOHI, pure iron-copper alloy, the one sheet metal you can safely trust under all conditions.

GOHI is pure iron with just the right amount of copper added to give it unusual quality, durability and workability. It is the longest-lasting, low-cost ferrous metal.

Homogeneous, soft, ductile, GOHI is easy to shape, cut, stamp, bend, seam, draw, form and weld. The preferred sheet metal for those who build to last; who take pride in quality and workmanship; who insist upon using the best.

GENUINE OPEN HEARTH IRON
GOHI
PURE IRON - COPPER ALLOY

GOHI pure iron—copper alloy, is available in all sizes and guages. Produced exclusively by the Newport Rolling Mill Company, Newport, Kentucky

GOHI SHEET METAL

Pronounced "GO-HIGH"

253

JUST BETWEEN US TWO

Book Review

WE are struggling painfully through James Joyce's "Ulysses" and our astonishment at Judge Woolsey's broadmindedness grows daily. One of Joyce's sentences is 67 pages long, and such a sentence! Still smarting under the rebuke for "little employees' magazine," we note that Joyce, too, has adjective trouble. He mentions "long yellow women's gloves." "Ulysses" is no suitable birthday gift for little Ronald.

Narrow Margin

OUR home town newspaper announces that the Civil Service Commission is holding examinations to fill A.A.A. positions of "Junior Agricultural Economists, $2,000 to $2,000 a year." Doubtless the entrants receiving highest marks will get $2,000; others, $2,000.

Hero

Samuel McGillicuddy is a man among men. D—
—anged if he didn't read his code from beginning to end!

Welcome

A LAUREL wreath to American Optical Co. for that eye-catching headline, "Eyes are *expensive* targets." Incidentally the makers of AO goggles are a new member of the family, or, more exactly, a strayed sheep returned to the fold.

Eaves Dropper

IN his scintillating department, "On the Assembly Line," our Detroit editor referred recently to the mysterious spread between list prices of automobiles and the price the buyer actually pays for a new car.

As evidence that the public is annoyed and puzzled by the spread, we offer this conversation overheard a few mornings ago on the 7:47.

"A" (reading an automobile newspaper ad): "Look what it says here, 'Now You Can Buy a So-an-So for So-Much.' That's a lotta bunk."

"B": "Yea, that gets my goat, too. Try and get one for that."

Our ignorance of automobile merchandising is abysmal, but maybe the automobile manufacturer who had the courage to quote delivered prices would win a great many friends.

Don't

WE mentioned recently that a welding shop sent us an advertising card reading, *"Gas tanks welded on your car with perfect safety, with gasoline in tank."* Then the shop asked us how to do it. As it appears to be a delicate trick, we hesitated to commit ourselves, and passed the buck to a welding authority. The answer is a trifle longer than, but of the same tone as, "Punch's" famous advice on marriage:

> *"We advise your subscriber most emphatically not to attempt to weld an automobile gasoline tank while the gasoline is in it."*

There the matter stands. We don't say it can't be done but we will continue to use chewing gum.

Marvelous

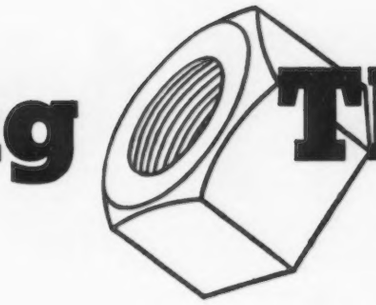
WE are never greatly impressed by such claims as, *"We sold xx thousand in three weeks."* The first order is always experimental. High pressure selling, mob psychology or curiosity can make the first sale. But the re-order—that's something else again. People buy the second time only what they liked the first time.

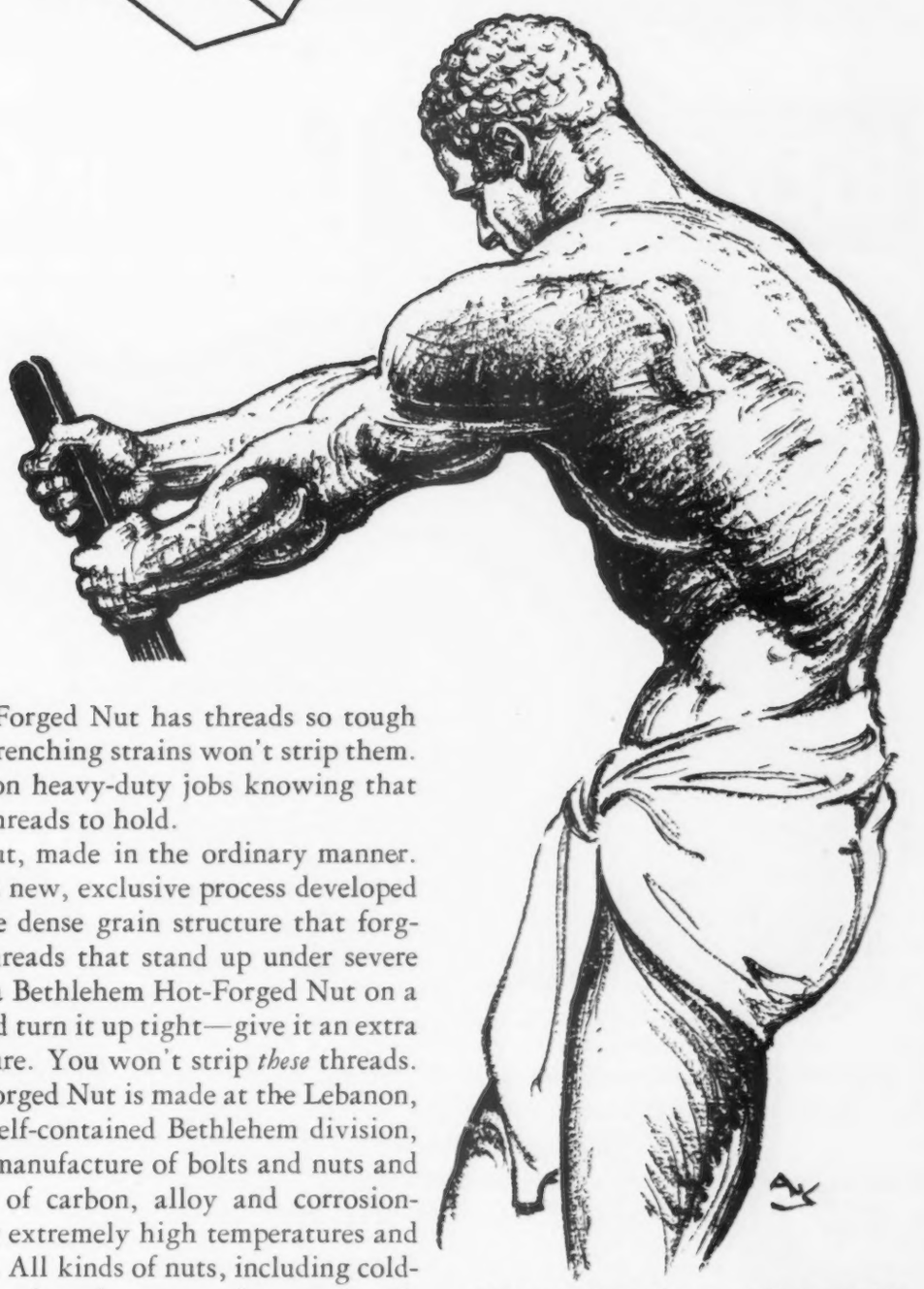
> *From July to November, 1933, 3,040 subscriptions for The Iron Age expired. We added up the paid renewals and they total 2,509. That's better than 82 per cent. There's a statistic that needs no embroidery.*

NEWS in Full Caps, B. F.

IN big, bold type the front page of the country's leading newspapers carried The Iron Age's report of the strike vote taken in some Steel Corporation plants. If you missed this sizzlingly hot and timely news turn to page 37, June 21 IA.—A.H.D.

Strong Threads





THE BETHLEHEM Hot-Forged Nut has threads so tough and strong that severe wrenching strains won't strip them. It is a nut you can use on heavy-duty jobs knowing that you can depend on the threads to hold.

It isn't an ordinary nut, made in the ordinary manner. It's a forging, made by a new, exclusive process developed by Bethlehem. It has the dense grain structure that forging gives, and strong threads that stand up under severe wrenching strains. Run a Bethlehem Hot-Forged Nut on a bolt, put on a wrench and turn it up tight—give it an extra half-turn for good measure. You won't strip *these* threads.

The Bethlehem Hot-Forged Nut is made at the Lebanon, Pa., Plant, a complete, self-contained Bethlehem division, devoted entirely to the manufacture of bolts and nuts and similar products. Bolts of carbon, alloy and corrosion-resisting steels. Bolts for extremely high temperatures and pressures. Spikes. Rivets. All kinds of nuts, including cold-punched as well as hot-forged nuts, and treated, oil-quenched and copper-bearing nuts. For your service a wide range of all standard commercial items is regularly carried in stock at Lebanon Plant, ready for immediate shipment.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

District Offices: Atlanta, Baltimore, Boston, Bridgeport, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Houston, Indianapolis, Milwaukee, New York, Philadelphia, Pittsburgh, St. Louis, St. Paul, Washington, Wilkes-Barre, York. *Pacific Coast Distributor:* Pacific Coast Steel Corporation, San Francisco, Seattle, Los Angeles, Portland, Honolulu. *Export Distributor:* Bethlehem Steel Export Corporation, New York.

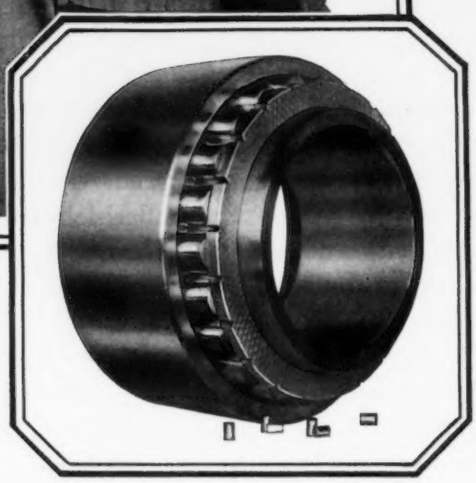
BETHLEHEM STEEL

Bethlehem Bolts and Nuts

BANTAM

STRAIGHT ROLLER RADIAL AND THRUST BEARINGS

USED ON MESTA FLYING SHEARS



Leading Manufacturers of Heavy Duty Production Equipment which is subjected to heavy loads and hard, continuous service, use Bantam Straight and Taper Roller Bearings because of the dependability which they have demonstrated under every condition of use and abuse

Trade Mark Reg. U.S. Pat. Off.

BBB

THE BANTAM BALL BEARING CO.

SOUTH BEND, INDIANA

BOSTON CHICAGO YOUNGSTOWN DETROIT HOUSTON NEW YORK NEW ORLEANS
PHILADELPHIA PITTSBURGH ROCHESTER, N. Y. ST. LOUIS SEATTLE TOLEDO WASHINGTON, D.C.

ONE OR A HUNDRED MILLION • ½" TO 60"

THERE CAN BE NO QUESTION

TONCAN IRON PIPE DOES LAST LONGER

Records of the service given by Toncan Iron Pipe in every type of installation prove conclusively that this modern alloy pipe does last longer. This statement holds true whether it is used in a plumbing or heating system in a building, in process lines in industrial plants, for supply and drainage lines on board ship, or carrying acid mine water far underground.

In the latest edition of "Pipe for Permanence" you will find the records of many comparative tests. And you will also find the technical information that explains why Toncan Iron Pipe consistently renders better service than other ferrous pipe slightly lower in cost.

Toncan Iron Pipe is the only pipe obtainable today that takes advantage of the properties of refined iron, copper and molybdenum to form an alloy that is rust-resisting to a higher degree than any other ferrous material, except the stainless alloys. It is the only pipe that combines with this rust-resisting feature the many advantages that Republic's Electric Weld Process alone can claim—100% perfect weld, straightness, roundness, uniform wall thickness, freedom from inside defects and absence of scale inside and out.

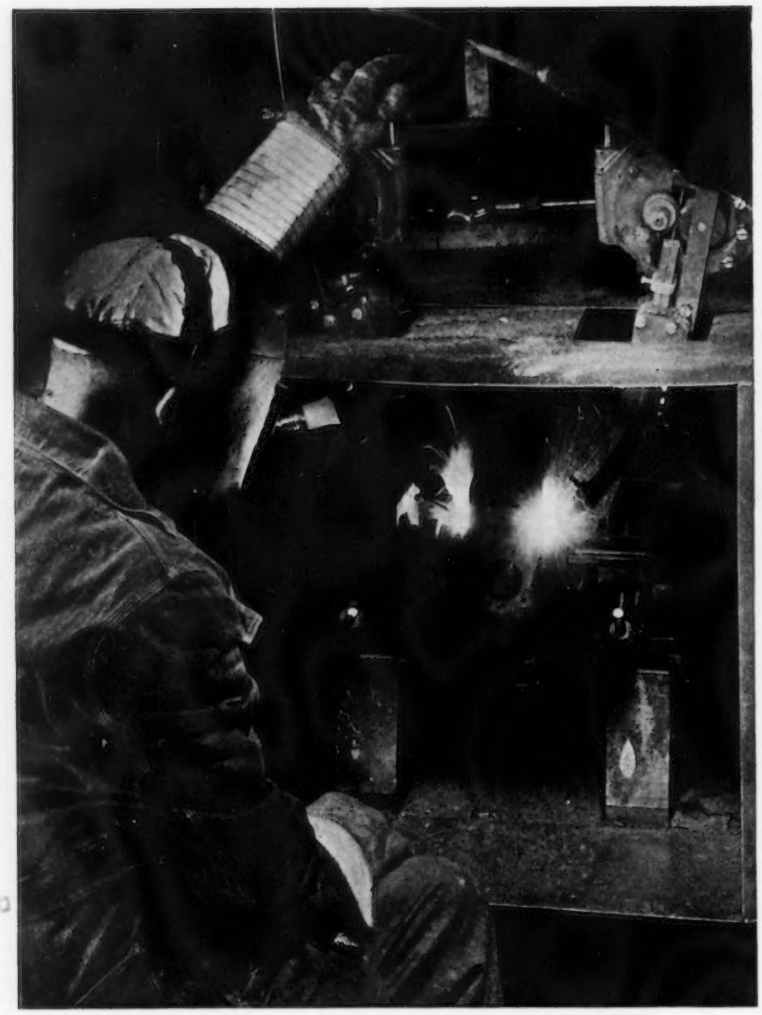
Every pipe buyer should know the facts. A copy of "Pipe for Permanence" will be sent on request.

REG. U.S. PAT. OFF.
TONCAN
COPPER
MO-LYB-DEN-UM
IRON PIPE

REPUBLIC STEEL CORPORATION

GENERAL OFFICES YOUNGSTOWN, OHIO

FASTER, MORE UNIFORM WELDS with the Weldomatic



A large automobile manufacturer uses the Weldomatic in the fabrication of front-wheel suspension units. Strong, uniform welds are a prime requirement here.

The compactness and light weight of the Weldomatic Head simplify its support and assure the best possible arrangement of work-handling equipment.

AUTOMATIC arc welding has important advantages over manual methods for many metal-working operations. It effects substantial savings by producing smoother, more uniform beads at greater speed, by eliminating the human element of manual operation, and by preventing the waste of electrode stub ends.

And before you buy automatic welding equipment, it will pay you to consider the following advantages of the Westinghouse Weldomatic:

All Electric Control — Automatic arc-voltage control keeps the wire feeding at a uniform speed, at the exact rate of electrode consumption assuring smoother and stronger welds. To vary arc voltage, the operator merely turns *one* rheostat knob.

Low Maintenance — The Weldomatic's simple, sturdy design, with minimum wearing parts, assures low upkeep costs. There are no springs, relays, clutches or delicate control devices to give trouble or wear out.

Other important features of the Weldomatic are: Compactness and light weight which simplify mounting — simple nozzle adjustment — totally-enclosed construction.

Let us send you complete information about the Weldomatic head and the applications for which it is best fitted. Just mail the coupon.

Westinghouse Electric & Manufacturing Co.
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Gentlemen: Please send me L. 20430 describing the Weldomatic.

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Automatic Arc Welders

HORSES ... by Flame ... out of Mill

They really are called horses . . . these V-type Diesel engine main frame members, produced here at Lukens by flame-cutting from plates of Lukens Cromansil Steel, rolled on the Lukens 206″ mill, the world's largest plate mill.

These horses transmit the gas loads from cylinder heads to main bearings. Since the gas load is about 38,000 pounds, of the nature of pure impact and occurring twelve times a second, it's a tough job for any horse, even if it's skilfully cut from high tensile steel, as these horses are.

Can we flame-cut you some horses . . . sawbucks . . . or what have you . . . and give you a product improvement along with a probable money-saving? Lukens Steel Company, Coatesville, Pennsylvania.

Lukens CROMANSIL Steel

"Don't tell me, Lad, they're putting the knee-action idea into welding machines."

"No, Pop, but you would think so if you welded with the 'Shield-Arc.' It levels out the peaks and valleys in the welding current."

"SHIELD-ARC'S" UNIFORM CURRENT SPEEDS UP WELDING

Time and again the Lincoln *"Shield-Arc"* welder has won competitive tests for speed of welding. There's nothing mysterious about this outstanding performance record. It is simply a matter of advanced design which allows the *"Shield-Arc"* to deliver a uniform current.

The advantage of the *"Shield-Arc's"* uniform current is that you are able to use a higher average current with less splattering and waste of molten electrode metal. Thus with a *"Shield-Arc"* more weld metal is deposited per unit of time . . . in terms of your pocketbook, more weld per dollar.

Ten other features help the *"Shield-Arc"* to produce high quality welds at lowest cost. In no other welder will you find all these features. That's why more Lincoln welders are in use today than any other make.

With new high capacity *"Shield-Arcs"* you can use ***larger size*** electrodes. Jumping only one size often saves 10 to 25 per cent in welding costs! And with any electrode you get guaranteed greater speeds with *"Shield-Arcs."* Start saving now. Ask for a free study of your welding costs.

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3. Sparkless Commutation
4. High Efficiency
5. Remote Control (without portable accessories)
6. Polarity Switch
7. Center Reading Meter
8. Dual Control
9. Laminated Magnetic Circuit
10. "Handy Height" Controls
11. Drip Proof, Welded Steel Construction

"SHIELD-ARC" has them all

LINCOLN

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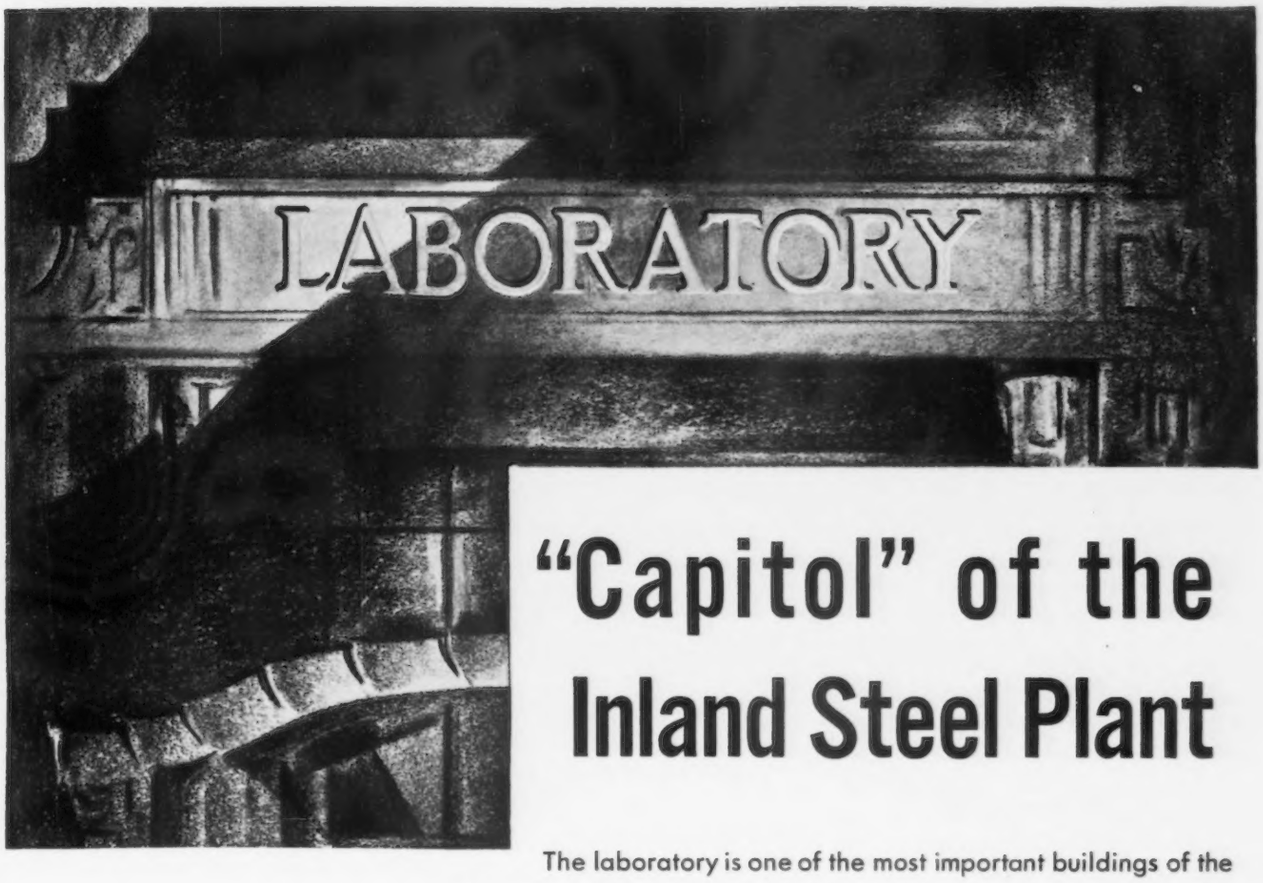

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Where Better Steel is Conceived

The laboratory is one of the most important buildings of the Inland Steel Plant. It is the seat of authority. In it safeguards of quality are set up that do not miss the smallest variable, and pioneering experiments are always under way which pay dividends to you in constantly higher, more exactly uniform quality of steel. In it records are kept which assure you the exact quality on a repeat order even though the first may have been placed many years ago.

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Rails Track Accessories Bars Rivets Billets

THE PICKLING TANK *is already Triflex-lined*

WHEN Inland Steel Company engineers faced the problem of having a new strip pickling unit constructed, their thought was not confined to provision for immediate contingencies. They projected their planning into future years and set out to build *the pickling tank of tomorrow.*

Their new 240-foot unit is comprised of 4 tanks, each 60 feet in length, 7 feet wide and about 5 feet deep. No excavation was necessary since all tanks rest on concrete piers at floor level. Equipped with sumps in the end for proper drainage, the tanks are emptied by 6-inch lead siphons operated with cold water. When a tank is covered and ventilated, one may stand right beside it, never realizing that pickling is in progress, never inhaling unhealthful fumes. In providing pickling facilities, Inland Steel Company engineers scientifically surveyed the issues of capital expenditure, operating expense, maintenance expense and working conditions. And just as scientifically did Goodrich meet every issue.

Goodrich is proud of Inland's pickling tank of tomorrow. For the entire unit *is in service today,* lined with ¼-inch Goodrich Triflex Rubber and sheathed with 8-inch brick laid up with Vitrobond. Ventilation is preserved through the use of rubber-lined pipe and rubber-lined fans. On every feature involving rubber lining, Goodrich engineers worked hand in hand with Inland officials.

Goodrich participation in this instance is typical of the service offered by a staff of Goodrich Research Engineers. They stand ready to work out for you those pickling problems of leakage, corrosion, abrasion, replacements and high maintenance expense. Let them explain—

● *Triflex-lined, Vulcalock Steel Pickling Tank. Brick sheathing was installed in this tank before it was placed in actual service. Note the Triflex expansion joints.*

Goodrich

OF TOMORROW • • •

● *The new strip pickling unit of the Inland Steel Co., Indiana Harbor, Ind.*

1) How Triflex, with its layer of hard rubber sandwiched between two layers of soft rubber resists corrosion and abrasion.

2) How Triflex, applied by the exclusive Goodrich Vulcalock Process, insures adhesion of 700 to 1000 pounds per square inch between rubber and steel.

3) How Triflex expansion joints, properly spaced in the rubber lining, prevent buckling and cracking under extremes of temperatures.

4) How brick sheathing, laid up with a special mortar, may be combined with Triflex,to give greater insulation in high temperatures and added protection against gouging. And how expansion joints, applied in the brick itself, give permanence to the whole installation.

Whatever your peculiar problems may be, Goodrich engineers will be glad to analyze them with you and to make specific recommendations. Complete designing and installation service is provided at no extra cost. The B. F. Goodrich Rubber Company, Mechanical Rubber Goods Division, Akron, Ohio.

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Rubber Lining

ALL *products problems* IN RUBBER

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Liquitol is sprinkled in the form of powder on molten metal as soon as the latter is up in the heads—covering the surface about one inch thick. Refeeding through this covering of Liquitol may be performed without any trouble or effect on the metal.

Liquitol is supplied in four grades for

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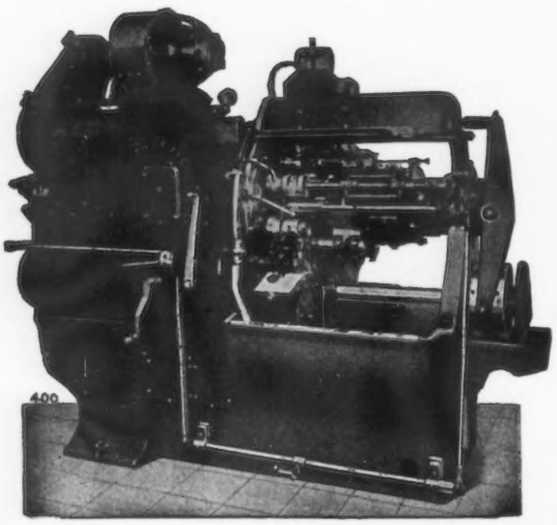

In operation the Baird Automatic Multiple Spindle Chucking Machine is unusually speedy. The time required for indexing and "air cuts" by tools is but 2¼ seconds for single indexing.

Equally important are the tooling arrangements whereby tools may be removed for grinding or replacement easily and quickly, thus minimizing another source of non-productive time.

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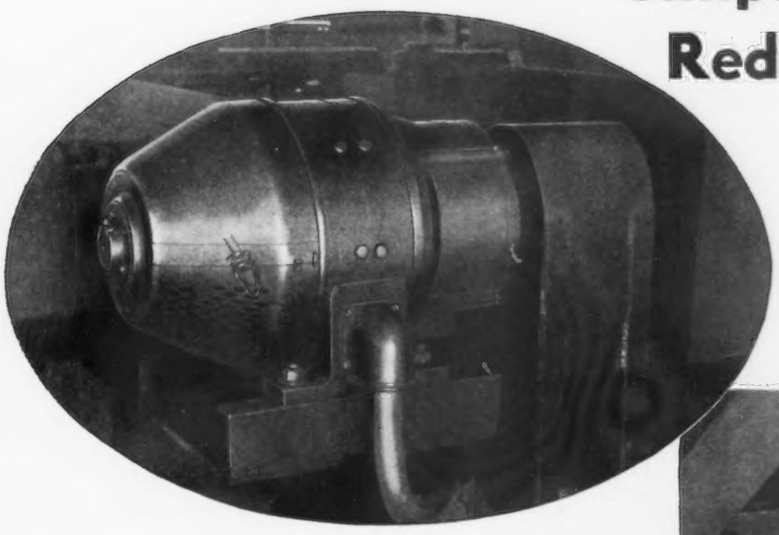
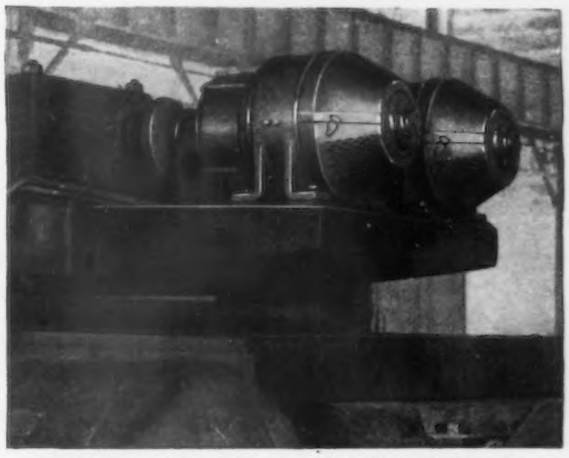
Simplify Installation
Reduce Maintenance
Save Space



DRIVING PLATE-HANDLING EQUIPMENT (*left*) — a G-E 5-hp. gear-motor fits conveniently into an out-of-the-way corner of the machine

DRIVING A SHEAR-TABLE ROLL — smooth, even, low-speed power is supplied by the reliable, easily installed G-E 5-hp. gear-motor shown above



DRIVING SCREW-DOWNS ON A ROLLER LEVELER — The two G-E 5-hp. gear-motors (*above*) provide a compact, yet easily accessible, installation

SINCE G-E gear-motors deliver the desired low speed direct to the output shaft, they eliminate the backgearing or countershafts formerly required by many steel-mill equipments. With them, therefore, you can save space, simplify installation, and reduce maintenance.

What's more, G-E gear-motors are efficient. They combine the economies of a normal-speed motor with the compactness of a built-in, helical-planetary gear-reducer. They are smooth-running, dependable, long-lived — the kind of drive that will save you money.

There are dozens of places around steel mills where you'll find it profitable to install these compact, efficient, low-speed units. They are available in standard voltages and ratings, both d-c. and a-c., from 1/6 to 75 hp., from 11 to 600 rpm. Various electrical and mechanical modifications can be made to meet your special needs. For additional information, request Bulletins GEA-1437B and GEA-1765. Address the nearest G-E office, or General Electric, Dept. 6C-201, Schenectady, N. Y.

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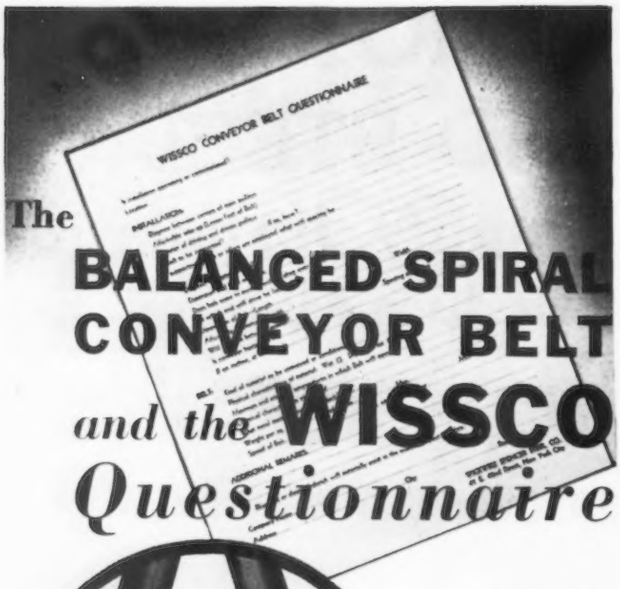

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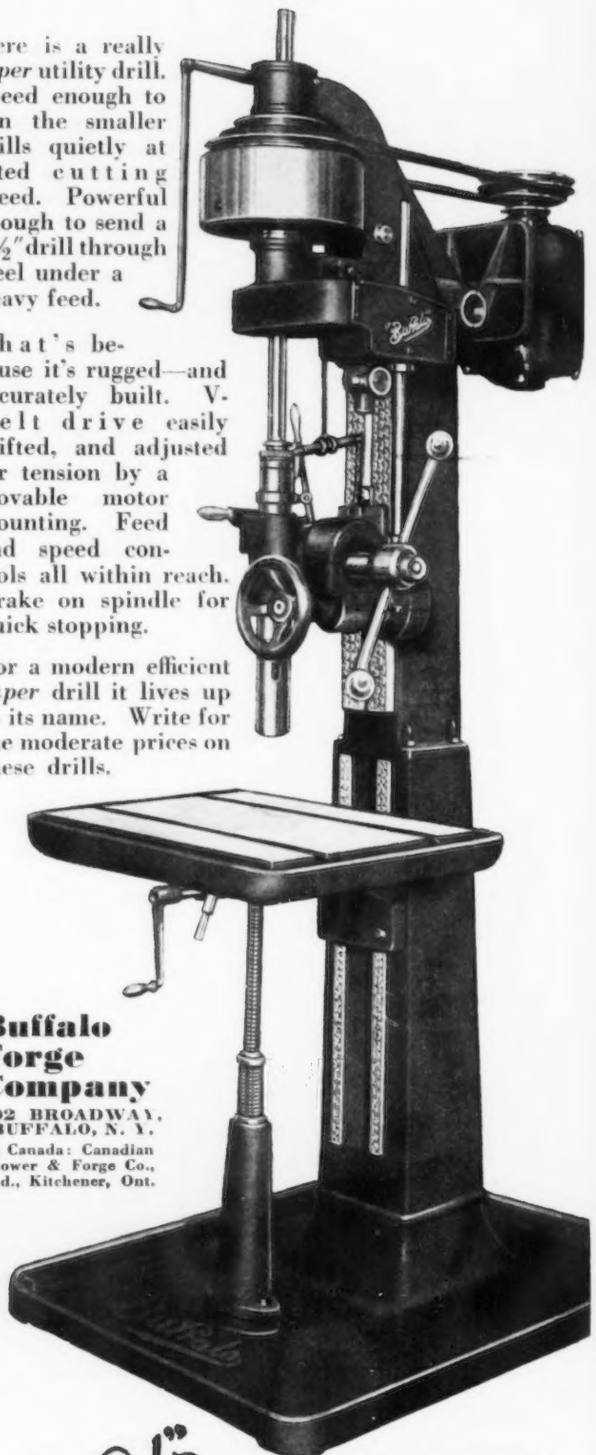

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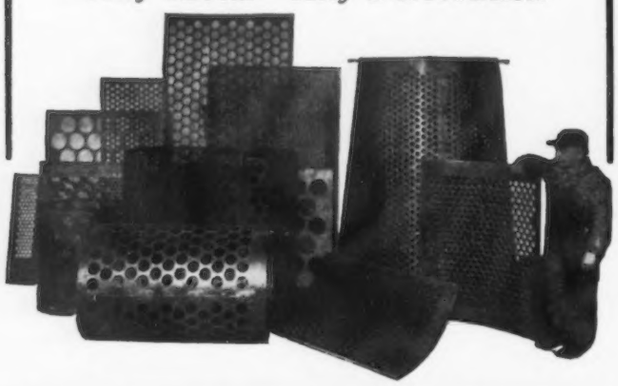

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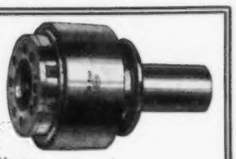

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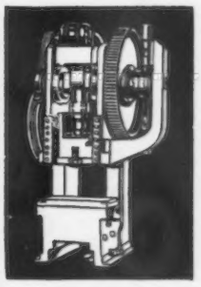

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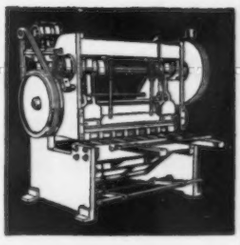

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Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Pacific Coast Steel Corp., San Francisco, Calif.
Ryerson, Jos. T., & Son, Inc., Chicago.
Steel & Tubes, Inc., Cleveland.
Weirton (W. Va.) Steel Co.

ANGLES, BEAMS, CHANNELS & TEES —Magnesium Alloys
Dow Chemical Co., Midland, Mich.

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ANODES—All Types
Udylite Process Co., Detroit.

ANODES—Cadmium
Udylite Process Co., Detroit.

ARBORS
Morse Twist Drill & Mch. Co., New Bedford, Mass.

ARRESTERS—Spark
Harrington & King Perforating Co., Chi.

AXLES—Car or Locomotive
Carnegie Steel Co., Pittsburgh.
Illinois Steel Co., Chicago.

BALLS—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.

BALLS—Steel, Brass or Bronze
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
New Departure Mfg. Co., Bristol, Conn.
S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.

BANDS—Steel
Bethlehem (Pa.) Steel Company.
Inland Steel Co., Chicago.

BANDS—Welded
Amer. Welding & Mfg. Co., Warren, O.

BARRELS—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Globe Mch. & Stpg. Co., Cleveland.

BARRELS—Tumbling
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Baird Mch. Co., Bridgeport, Conn.
Globe Mch. & Stpg. Co., Cleveland.

BARS—Alloy
Republic Steel Corp., Youngstown, Ohio.

BARS—Aluminum
Aluminum Co. of America, Pittsburgh.

BARS—Brass & Bronze
Johnson Bronze Co., New Castle, Pa.

BARS—Cold Drawn
Union Drawn Steel Co., Massillon, Ohio.

BARS—Concrete, Reinforcing
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Laclede Steel Co., St. Louis, Mo.
Pacific Coast Steel Corp., San Francisco, Calif.

BARS—Magnesium Alloys
Dow Chemical Co., Midland, Mich.

BARS—Steel
Ames, W., & Co., Jersey City, N. J.
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Company.
Carnegie Steel Co., Pittsburgh.
Illinois Steel Co., Chicago.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Joseph T., & Son, Inc., Chicago.
Steel & Tubes, Inc., Cleveland.
Timken Roller Bearing Co., Canton, Ohio.
Timken Steel & Tube Co., The, Canton, O.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co.

BASES—Column, Machinery
Lukens Steel Co., Coatesville, Pa.

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Breese Bros. Co., Cincinnati.

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Electric Storage Battery Co., Phila.

BATTERY CHARGERS
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Bunting Brass & Bronze Co., Toledo, O.
Cramp Brass & Iron Foundries Co., Phila.
Johnson Bronze Co., New Castle, Pa.

BEARINGS—Ball
Bantam Ball Bearing Co., South Bend, Ind.
Federal Bearings Co., Inc., Poughkeepsie, N. Y.
New Departure Mfg. Co., Bristol, Conn.
S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

BEARINGS—Brass and Bronze
Bunting Brass & Bronze Co., Toledo, O.
Cramp Brass & Iron Foundries Co., Phila.
Johnson Bronze Co., New Castle, Pa.

BEARINGS—Laminated, Non-Metallic
Synthane Corp., Oaks, Pa.

BEARINGS—Oilless
Rhoades, R. W. Metalline Co., Inc., Long Island City, N. Y.

BEARINGS—Quill Roller
Bantam Ball Bearing Co., South Bend, Ind.

BEARINGS—Radial
Bantam Ball Bearing Co., South Bend, Ind.
S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.

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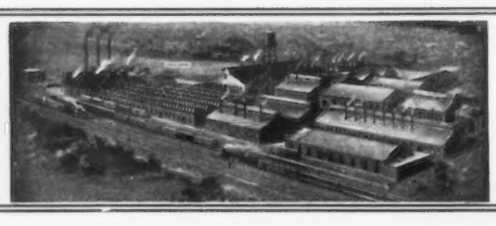

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E. F. Krause & Co.—817 Yale Street, Los Angeles, Calif.
Hill Chase & Co.—Richmond and Ontario Sts., Philadelphia, Pa.
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Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Timken Roller Bearing Co., Canton, O.

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Timken Roller Bearing Co., Canton, O.

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S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.
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Clipper Belt Lacer Co., Grand Rapids, Mich.

BELT LACER
Bristol Co., Waterbury, Conn.
Clipper Belt Lacer Co., Grand Rapids, Mich.

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Chicago (Ill.) Rawhide Mfg. Co., 1306 Elston Ave.
Schieren, Chas. A., Co., 30 Ferry St., N. Y. C.

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Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

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Goodrich, B. F., Rubber Co., Akron, Ohio.

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Allis-Chalmers Mfg. Co., Milwaukee.

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Landis Mch. Co., Inc., Waynesboro, Pa.
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CLEVELAND, OHIO

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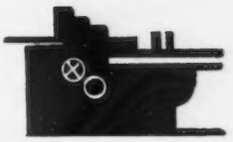

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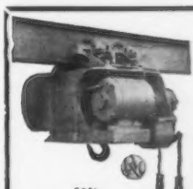

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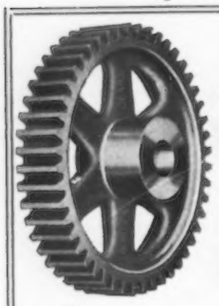

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Botfield Refractories Co., Philadelphia, Pa.

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Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.

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Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.

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National Mchry. Co., Tiffin, Ohio.

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RIVETERS—Squeeze
Norin Engineering Co., Chicago, Illinois.

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Shuster, F. B., Co., New Haven, Conn.

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Clark Bros. Bolt Co., Milldale, Conn.
Hassall, John, Inc., Clay & Oakland Sts., Bklyn., N. Y.
Oliver Iron & Steel Corp., Pittsburgh.
Progressive Mfg. Co., Torrington, Conn.
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Ryerson, Jos. T., & Son, Inc., Chicago.

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Pittsburgh (Pa.) Steel Co.
Wilson Welder & Metals Co., Inc., North Bergen, N. J.

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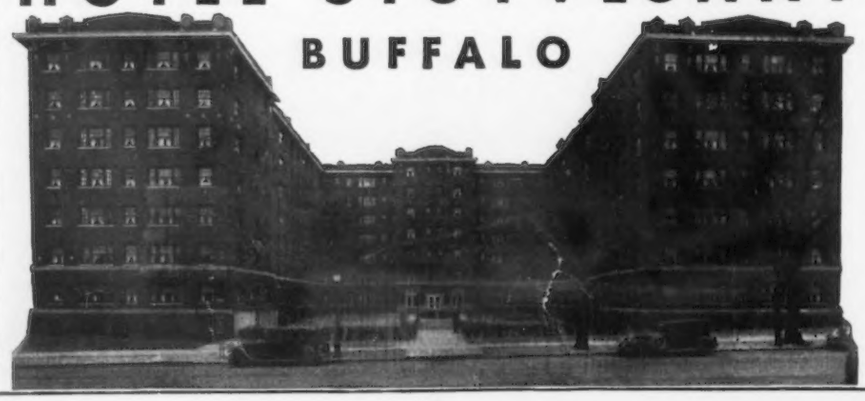

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STAMPS—Steel Alphabets and Figures
Dickey-Grabler Co., Cleveland.
Noble & Westbrook Mfg. Co., Hartford, Ct.

STAPLES—Wire
Titchener, E. H., & Co., Binghamton, N. Y.
Wickwire Brothers, Cortland, N. Y.

STEEL—Acid Resisting
Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

STEEL—Alloy
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Chicago.
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Company.
Bissett Steel Co., The, Cleveland.
Carpenter Steel Co., 121 W. Bern St., Reading, Pa.
Detroit (Mich.) Alloy Steel Co.
Harrisburg (Pa.) Pipe & Pipe Bending Co.
Ingersoll Steel & Disc Co., Chicago.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Pacific Coast Steel Corp., San Francisco, Calif.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T. & Son, Inc., Chicago.
Timken Roller Bearing Co., Canton, Ohio.
Timken Steel & Tube Co., The, Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

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STEEL—Alloy, Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.
Wyckoff Drawn Steel Co., Ambridge, Pa.

STEEL—Bright Finished
Union Drawn Steel Co., Massillon, Ohio.

STEEL—Carbon
Andrews Steel Co., The, Newport, Ky.
Carnegie Steel Co., Pittsburgh.
Carpenter Steel Co., 121 W. Bern St., Reading, Pa.
Harrisburg (Pa.) Pipe & Pipe Bending Co.
Ingersoll Steel & Disc Co., Chicago.
Latrobe (Pa.) Electric Steel Co.

STEEL—Carbon Vanadium
Andrews Steel Co., The, Newport, Ky.
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome
American Steel & Wire Co., Chicago.
Andrews Steel Co., The, Newport, Ky.
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome Manganese
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome Nickel
American Steel & Wire Co., Chicago.
Andrews Steel Co., The, Newport, Ky.
Harrisburg (Pa.) Pipe & Pipe Bending Co.
Latrobe (Pa.) Electric Steel Co.

STEEL—Chrome Nickel Silver
Ingersoll Steel & Disc Co., Chicago.

STEEL—Chrome Vanadium
Andrews Steel Co., The, Newport, Ky.
Harrisburg (Pa.) Pipe & Pipe Bending Co.
Latrobe (Pa.) Electric Steel Co.

STEEL—Cold Drawn
American Steel & Wire Co., Chicago.
Bliss & Laughlin, Inc., Harvey, Ill.
Jones & Laughlin Steel Corp., Pittsburgh.
Latrobe (Pa.) Electric Steel Co.
Rathbone, A. B. & J., Palmer, Mass.
Ryerson, Joseph T., & Son, Inc., Chicago.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Ambridge, Pa.

STEEL—Cold Rolled Strips
Acme Steel Co., Chicago.
American Steel & Wire Co., Chicago.
Athenia Steel Co., 135 William St., N. Y.
Griffin Mfg. Co., Erie, Pa.
Inland Steel Co., Chicago.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Stanley Works, The, New Britain, Conn.
Steel & Tubes, Inc., Cleveland.
Superior Steel Corp., Grant Bldg., Ptgh.
Thomas Steel Co., Warren, Ohio.
Weirton (W. Va.) Steel Co.
West Leechburg Steel Co., Pittsburgh.
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Cold Rolled Strips, Chrome Nickel
Acme Steel Co., Chicago.
Griffin Mfg. Co., Erie, Pa.

STEEL—Cold Rolled Strips, Electric Copper Coated
Thomas Steel Co., Warren, Ohio.

STEEL—Cold Rolled Strips, Electro-Galvanized
Thomas Steel Co., Warren, Ohio.

STEEL—Cold Rolled Strips, Electro Tin Coated
Thomas Steel Co., Warren, Ohio.

STEEL—Corrosion Resisting
American Steel & Wire Co., Chicago
Carpenter Steel Co., 121 W. Bern St., Reading, Pa.
Midvale Co., The, Nicetown, Phila., Pa.

STEEL—Crucible
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Cutlery
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.

STEEL—Die
Andrews Steel Co., The, Newport, Ky.
Carpenter Steel Co., 121 W. Bern St., Reading, Pa.
Disston, Henry, & Sons, Inc., Philadelphia.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.

STEEL—Drill
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Pacific Coast Steel Corp., San Francisco, Calif.

STEEL—Electric
Disston, Henry, & Sons, Inc., Philadelphia.
Inland Steel Co., Chicago.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Timken Roller Bearing Co., Canton, Ohio.
Timken Steel & Tube Co., The, Canton, O.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—High Speed
Bethlehem (Pa.) Steel Company
Carpenter Steel Co., 121 W. Bern St., Reading, Pa.
Ingersoll Steel & Disc Co., Chicago.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL—Hot Rolled Strips
Illinois Steel Co., Chicago.
Inland Steel Co., Chicago.
Laclede Steel Co., St. Louis, Mo.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Stanley Works, The, New Britain, Ct.
Steel & Tubes, Inc., Cleveland.
Superior Steel Corp., Grant Bldg., Ptgh.
Weirton (W. Va.) Steel Co.
West Leechburg Steel Co., Pittsburgh.

STEEL—Hot Rolled Strips, Electro Zinc Coated
Thomas Steel Co., Warren, O.

STEEL—Magnet
Carpenter Steel Co., 121 W. Bern St., Reading, Pa.
Latrobe (Pa.) Electric Steel Co.

STEEL—Nickel
Andrews Steel Co., The, Newport, Ky.

STEEL—Open Hearth
Andrews Steel Co., The, Newport, Ky.
Pittsburgh (Pa.) Steel Co.
Timken Roller Bearing Co., Canton, Ohio.
Timken Steel & Tube Co., The, Canton, O.

STEEL—Rustless
Carpenter Steel Co., 121 W. Bern St., Reading, Pa.
Griffin Mfg. Co., Erie, Pa.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.

STEEL—Screw
Bliss & Laughlin, Inc., Harvey, Ill.
Timken Roller Bearing Co., Canton, Ohio.
Timken Steel & Tube Co., The, Canton, O.
Union Drawn Steel Co., Massillon, Ohio.
Wyckoff Drawn Steel Co., Ambridge, Pa.

STEEL—Special Analysis
Andrews Steel Co., The, Newport, Ky.
Carpenter Steel Co., 121 W. Bern St., Reading, Pa.
Harrisburg (Pa.) Pipe & Pipe Bending Co.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Republic Steel Corp., Youngstown, Ohio.
Timken Roller Bearing Co., Canton, Ohio.
Timken Steel & Tube Co., The, Canton, O.
West Leechburg Steel Co., Pittsburgh.

STEEL—Spring
Athenia Steel Co., 135 William St., N. Y.
Barnes-Gibson-Raymond, Inc., Detroit.
Barnes, Wallace, Co., The, Bristol, Conn.
Gibson, Wm. D., Co., Chicago.
Republic Steel Corp., Youngstown, Ohio.
Timken Roller Bearing Co., Canton, Ohio.
Timken Steel & Tube Co., The, Canton, O.

STEEL—Stainless
American Steel & Wire Co., Chicago.
Bethlehem (Pa.) Steel Company.
Carnegie Steel Co., Pittsburgh.
Carpenter Steel Co., 121 W. Bern St., Reading, Pa.
Disston, Henry, & Sons, Inc., Philadelphia.
Illinois Steel Co., Chicago.
Latrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Midvale Co., The, Nicetown, Phila., Pa.
Republic Steel Corp., Youngstown, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Union Drawn Steel Co., Massillon, Ohio.
Wetherell Bros. Co., Cambridge, 39, Mass.

STEEL—Stainless Clad
Ingersoll Steel & Disc Co., Chicago.

STEEL—Tool
Bethlehem (Pa.) Steel Company
Bissett Steel Co., The, Cleveland.
Carpenter Steel Co., 121 W. Bern St., Reading, Pa.
Detroit (Mich.) Alloy Steel Co.
Disston, Henry, & Sons, Inc., Philadelphia.
Ingersoll Steel & Disc Co., Chicago.
Lathrobe (Pa.) Electric Steel Co.
Ludlum Steel Co., Watervliet, N. Y.
Midvale Co., The, Nicetown, Phila., P
Ryerson, Jos. T., & Son, Inc., Chicago.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

STEEL—Tool—Cast
Detroit (Mich.) Alloy Steel Co.

STEEL—Tool, Special Shapes
Latrobe (Pa.) Electric Co.

STEEL—Vanadium
Andrews Steel Co., The, Newport, Ky.
Latrobe (Pa.) Electric Steel Co.

STEEL PLANTS AND ROLLING MILLS
Perin Engineering Co., Inc., 535 Fifth Ave., N. Y. C.

STEEL PLATE CONSTRUCTION
Graver Tank & Mfg. Corp., East Chicago, Ind.

STENCILS—Brass
Dickey-Grabler Co., Cleveland

STEPS—Ladder and Stairs, Safety
Blaw-Knox Co., Pittsburgh.
Central Iron & Steel Co., Harrisburg, Pa.

STOCKS AND DIES
Jones & Lamson Mch. Co., Springfield, Vt.

STOPS—Crane Limit
Electric Controller & Mfg. Co., Cleveland.

STRAIGHTENING MACHINES—Bar & Tube
Medart Co., The, St. Louis, Mo.

STRUCTURAL IRON AND STEEL WORK
American Bridge Co., Pittsburgh.
Morgan Engineering Co., Alliance, Ohio.

STRUCTURAL STEEL—See Angles, Beams, Channels and Tees

SWAGING MACHINES
Quickwork Co., The, St. Marys, Ohio.
Torrington (Ct.) Co.

SWITCHES—Electric
Westinghouse Elec. & Mfg. Co., East Ptgh.

TACHOMETERS—Angular and Linear Velocity
Barbour-Stockwell Co., Cambridge, Mass.

TAGS—Metal
Dickey-Grabler Co., Cleveland.

TANK LINING
Celcote Co., The, Cleveland.

TANK LININGS—Rubber
American Hard Rubber Co., 11 Mercer St., N. Y. C.
Goodrich, B. F., Rubber Co., Akron, Ohio.

TANKS—Compressed Air, Gas, Oil and Water
Graver Tank & Mfg. Corp., East Chicago, Ind.
Scaife, Wm. B., & Sons Co., Ptgh.
Westinghouse Traction Brake Co., Industrial Div., Pittsburgh.

TANKS—Elevated Steel
Graver Tank & Mfg. Corp., East Chicago, Ind.

TANKS—Elevated Wood
Hauser-Stander Tank Co., Cincinnati, Ohio.

TANKS—Gasoline and Oil
Graver Tank & Mfg. Corp., East Chicago, Ind.

TANKS—Iron and Steel
Breese Bros. Co., Cincinnati, Ohio.
Scaife, Wm. B., & Sons Co., Ptgh.

TANKS—Lead Lined
Hauser-Stander Tank Co., Cincinnati, Ohio

TANKS—Pickling
American Hard Rubber Co., 11 Mercer St., N. Y. C.
Blaw-Knox Co., Pittsburgh.
Hauser-Stander Tank Co., Cincinnati, Ohio.
Nukem Products Corp., 68 Niagara St. Buffalo.

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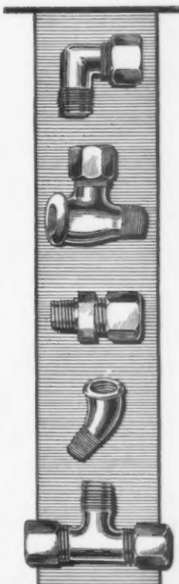

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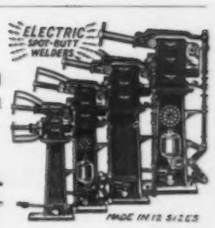

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HYDE PARK FOUNDRY & MACHINE CO.
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TANKS—Rubber Lined
American Hard Rubber Co., 11 Mercer St., N. Y. C.
Blaw-Knox Co., Pittsburgh.
Hauser-Stander Tank Co., Cincinnati, O.

TANKS—Water
Hauser-Stander Tank Co., Cincinnati, O.

TANKS—Welded
Blaw-Knox Co., Pittsburgh.
National Tube Co., Pittsburgh
Scaife, Wm. B., & Sons Co., Pittsburgh.

TANKS—Wood
Hauser-Stander Tank Co., Cincinnati, O.

TAPPING MACHINES
National Automatic Tool Co., Richmond, Ind.

TAPPING MACHINES—Nuts
National Mchry. Co., Tiffin, Ohio.

TAPS—Collapsing
Landis Mach. Co., Inc., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.

TAPS AND DIES
Landis Mch. Co., Inc., Waynesboro, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

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TELEPHONES—Interior
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TERNE PLATES
American Sheet & Tin Plate Co., Ptgh.

TERNE PLATES—Copper Bearing
Weirton (W. Va.) Steel Co.

TESTING MACHINES—Materials
Baldwin-Southwark Corp., Philadelphia.

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Bristol Co., Waterbury, Conn.

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THREAD ROLLING MACHINES
Nilson, A. H., Mach Co., Bridgeport, Ct.

THREADING MACHINES
Landis Mch. Co., Waynesboro, Pa.
National Mchry. Co., Tiffin, Oh'o.

THREADING MACHINES—Automatic
Landis Mch. Co., Inc., Waynesboro, Pa.

THREADING MACHINES—Bolt
Murchey Machine & Tool Co., Detroit.

TIE PLATES
Illinois Steel Co., Chicago.
Inland Steel Co., Chicago.
Weirton (W. Va.) Steel Co.

TIES—BALE
American Steel & Wire Co., Chicago.
American Sheet & Tin Plate Co., Ptgh.

TIN PLATE
Granite City (Ill.) Steel Co.
Jones & Laughlin Steel Corp., Pittsburgh.
Pacific Coast Steel Corp., San Francisco, Calif.
Republic Steel Corp., Youngstown, O.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co.

TIN PLATE MACHINERY
Wean Engineering Co., Inc., The, Warren, Ohio.

TINNING EQUIPMENT—Sheets
Wean Engineering Co., Inc., The, Warren, Ohio.

TIRE SETTING MACHINES
Davis Keyseater Co., 400 Exchange St., Rochester, N. Y.

TOOL BITS
Carboloy Co., Inc., 2495 Grand Blvd., Detroit.
Carpenter Steel Co., 121 W. Bern St., Reading, Pa.
Haynes Stellite Co., 30 East 42nd St., N. Y. C.

TOOL HOLDERS
Armstrong Bros. Tool Co., Chicago.

TOOLS—Lathe
Armstrong Bros. Tool Co., Chicago.
Carboloy Co., Inc., 2495 Grand Blvd., Detroit.

TOOLS—Metal Cutting
Carboloy Co., Inc., 2495 Grand Blvd., Detroit.
Haynes Stellite Co., 30 East 42nd St., N. Y. C.

TOOLS—Tungsten Carbide
Carboloy Co., Inc., 2495 Grand Blvd., Detroit.

TOOLS—Welded Tip
Haynes Stellite Co., 30 East 42nd St., N. Y. C.

TORCHES—Brazing, Cutting and Welding
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
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TRAILERS—Industrial—See Trucks, Tractors and Trailers—Industrial

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Cleveland Electric Tramrail, Wickliffe, O.
Osborn Mfg. Co., Cleveland.

TRAMWAYS—Wire Rope
American Steel & Wire Co., Chicago.
Leschen, A., & Sons Rope Co., St. Louis, Mo.

TRUCKS—Elevating (Power)
Elwell-Parker Electric Co., The, Cleveland.
Ready-Power Co., 3824 Grand River Ave., Detroit, Mich.

TRUCKS, TRACTORS AND TRAILERS —Industrial
Atlas Car & Mfg. Co., Cleveland.
Elwell-Parker Electric Co., The, Cleveland.
Ready-Power Co., 3824 Grand River Ave., Detroit, Mich.

TUBE MILL MACHINERY
Treadwell Engineering Co., Easton, Pa.

TUBES—Boiler
National Tube Co., Pittsburgh.
Pittsburgh (Pa.) Steel Co.

TUBES—High Carbon
Steel & Tubes, Inc., Cleveland.

TUBES—Nickel Silver
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TUBES—Stainless Steel
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TUBING—Aluminum Seamless
Aluminum Co. of America, Pittsburgh.

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Bissett Steel Co., The, Cleveland.

TUBING—Hard Rubber
American Hard Rubber Co., 11 Mercer St., N. Y. C.

TUBING—Magnesium Alloys
Dow Chemical Co., Midland, Mich.

TUBING—Nichrome
Steel & Tubes, Inc., Cleveland.

TUBING—Open Seam
Steel & Tubes, Inc., Cleveland.

TUBING—Phosphor Bronze
Phosphor Bronze Smelting Co., Philadelphia.
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TUBING—Rubber
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TUBING—Seamless Steel
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Pittsburgh (Pa.) Steel Co.
Steel & Tubes, Inc., Cleveland.
Timken Roller Bearing Co., Canton, Ohio.
Timken Steel & Tube Co., The, Canton, O.
Youngstown (Ohio) Sheet & Tube Co.

TUBING—Square and Rectangular
Steel & Tubes, Inc., Cleveland.

TUBING—Stainless Steel
Steel & Tubes, Inc., Cleveland.

TUBING—Tinned Brass, Copper and Steel
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TUBING—Tool Steel
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TUBING—Welded Steel
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National Tube Co., Pittsburgh.
Steel & Tubes, Inc., Cleveland.
Youngstown (Ohio) Sheet & Tube Co.

TUBULAR PRODUCTS
National Tube Co., Pittsburgh.
Steel & Tubes, Inc., Cleveland.

TUMBLING BARRELS—See Barrels—Tumbling

TUNGSTEN CARBIDE
Carboloy Co., Inc., 2495 Grand Blvd., Detroit.

TURBO-COMPRESSORS
Spencer Turbine Co., Hartford, Conn.

TURNTABLES
American Bridge Co., Pittsburgh.

TWIST DRILLS
Cleveland (Ohio) Twist Drill Co.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

TYPE—Steel
Noble & Westbrook Mfg. Co., Hartford, Conn.

UNIONS
Central Forging Co., The Catawissa, Pa.
Crane Co., Chicago.
Dart, E. M., Mfg. Co., Prov., R. I.

VALVE DISCS
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VALVES—Acid Resisting
Duriron Co., Inc., The, 438 N. Findlay St., Dayton, Ohio.

VALVES—Air Operating
Westinghouse Traction Brake Co., Industrial Div., Pittsburgh.

VALVES—Gas, Water and Steam
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Jarecki Mfg. Co., Erie, Pa.
Wood, R. D., & Co., Philadelphia.

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Crane Co., Chicago.
Wood, R. D., & Co., Philadelphia.
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Garlock Packing Co., The, Palmyra, N. Y.
VARNISH—Acid Resisting
Nukem Products Corp., 68 Niagara St., Buffalo.
VISES
Jarecki Mfg. Co., Erie, Pa.
WASHERS—Iron or Steel
Central Iron & Steel Co., Harrisburg, Pa.
Smith, Thomas, Co., 286 Grove St., Worcester, Mass.
WASHERS—Leather
Chicago (Ill.) Rawhide Mfg. Co., 1306 Elston Ave.
Schieren, Chas. A., Co., 30 Ferry St., N. Y. C.
WATER SOFTENERS AND PURIFIERS
Scaife, Wm. B., & Sons Co., Ptgh.
WELDING—Copper Hydrogen Electric
Bundy Tubing Co., Detroit, Mich.
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Westinghouse Elec. & Mfg. Co., East Ptgh.
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Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.
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Thomson-Gibb Elec. Welding Co., Lynn, Mass.
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Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., Cleveland.
Thomson-Gibb Elec. Welding Co., Lynn, Mass.
Westinghouse Elec. & Mfg. Co., East Ptgh.
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Thomson-Gibb Elec. Welding Co., Lynn, Mass.
WELDING MACHINES—Seam
Thomson-Gibb Elec. Welding Co., Lynn, Mass.
WELDING MACHINES—Spot
Eisler Engineering Co., Inc., 754 S. 13th St., Newark, N. J.
Thomson-Gibb Elec. Welding Co., Lynn, Mass.
WHEELS—Rolled Steel
Carnegie Steel Co., Pittsburgh.
Illinois Steel Co., Chicago.
WIRE—Aluminum
Aluminum Co. of America, Pittsburgh.
WIRE—Barb
Jones & Laughlin Steel Corp., Pittsburgh.
Pittsburgh (Pa.) Steel Co.
WIRE—Brass, Bronze, Copper, Nickel, Silver or Phosphor Bronze
Michigan Wire Cloth Co., 2117 Howard St., Detroit.
Phosphor Bronze Smelting Co., Philadelphia.
Riverside (N. J.) Metal Co.
Seymour (Conn.) Mfg. Co.
WIRE—Electric Heat Resisting
Globar Corp., Niagara Falls, N. Y.
WIRE—Flat, Round, Square or Special Shapes
American Steel & Wire Co., Chicago.
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Pacific Coast Steel Corp., San Francisco, Calif.
Page Steel & Wire Co., Monessen, Pa.
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Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.
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Roebling's, John A., Sons Co., Trentor N.J.
Wickwire Brothers, Cortland, N. Y
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Wickwire Spencer Steel Co., 41 East 42nd St., N. Y. C.
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WIRE—Spoke and Crimping
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.
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Page Steel & Wire Co., Monessen, Pa.
WIRE—Steel
Wickwire Brothers, Cortland, N. Y.
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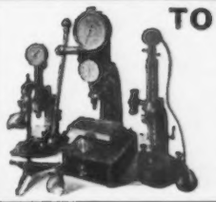

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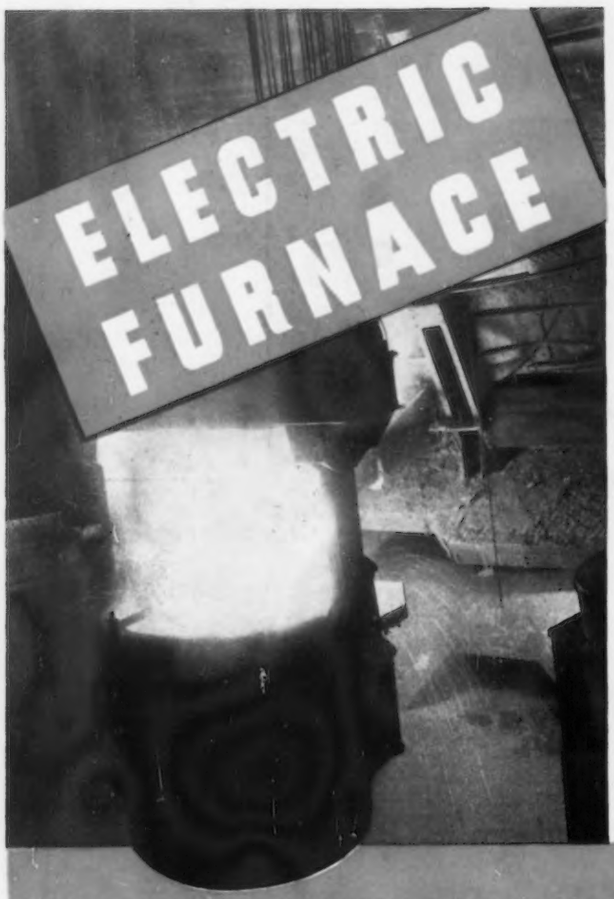

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